VOL. LIII.
New Series Vol. 6, No. 4.

JULY, 1918

$3.00 per Annum.
Foreign, $3.60. Canada, $3.25.
Single Copies, 30 Cents in U. S.

# JOURNAL
OF THE
# American Veterinary Medical Association

FORMERLY
AMERICAN VETERINARY REVIEW
(Original Official Organ U. S. Vet. Med. Ass'n)
EDITED AND PUBLISHED FOR
The American Veterinary Medical Association by Pierre A. Fish, Ithaca, N. Y.

CONGRESS LIBRARY JUN 30 1918

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THE JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION is issued the first of each month. *Manuscripts and copy for insertion should be as nearly perfect as possible for the printer and should be received by the 10th of the preceding month to insure insertion in the next month's issue.* Volumes begin in April and October.

Communications relating to publication, subscriptions, advertisements and remittances should be addressed to JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, ITHACA, N. Y. Matters pertaining to the American Veterinary Medical Association and Membership should be sent to Dr. L. Enos Day, Acting Secretary, 1827 So. Wabash Ave., Chicago, Ill.

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VOL. LIII., N. S. VOL. VI. JULY, 1918. NO. 4.

**Communications relating to membership and matters pertaining to the American Veterinary Medical Association should be addressed to Acting Secretary L. Enos Day, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.**


## CONSERVING HEALTH

Many factors have at various times been enumerated as essential to the winning of the war. Man-power, food, ships, airplanes, labor, munitions and morale are concerned. Not one of these factors as a separate entity is sufficient. They must be properly coordinated and directed. The power concerned in the production of each factor is health.

Facing us is an implacable, relentless and intriguing foe by no means subdued, or likely to be, until much fresh blood from the armies of this country is mingled with that of the allies upon the shell-torn soil of France, Belgium and Italy. America has the privilege of *helping* to win this war, which for nearly four long and bitter years the allies have so gloriously and so patiently endured. If America is to *help* win freedom for the world, to *help* take the Germ out of Germany—the germ of the hellish heresy that she is divinely appointed to dominate the world, that murder, rape, enslavement, extermination, thievery and hypocrisy are justifiable when committed in the service of the State; then our country must be prepared for the sacrifice involved in the depreciation of our man-power and submit as cheerfully as have the allies to the

necessary restrictions upon our usual method of life. The horror of today will give way to the peace of tomorrow. The present is in our hands; the future is in the hands of our children. In fighting for their freedom, it is a correlative duty to conserve their lives under healthy conditions in order to conserve the strength of the Nation.

War does not take its toll from casualties alone. Disease and pestilence have stalked through the ranks and in former wars have caused even greater havoc than have bullets and shells. The strategy of sanitation, immunology and correlated branches is as important as military strategy. The discoveries of Pasteur, Lister and Koch have made possible the restoration of a larger percentage of the wounded than ever before. Quite as favorable results have been obtained in the prevention of disease.

In the light of the present day efficiency, it is difficult to believe that only twenty years ago, in the Spanish-American campaign, 86 per cent of all deaths were due to typhoid fever which attacked and weakened practically 20 per cent of the small army employed for a few months. In 1911, anti-typhoid inoculation was made compulsory in the United States Army. For a slightly longer period than the Spanish-American conflict there was an average of over 742,000 men in American cantonments and camps, and only 114 cases of typhoid fever occurred—a signal triumph over former conditions. The deaths from wounds among the American overseas forces have been approximately only about five per cent.

In the Civil War, the federal forces lost 110,000 men as the result of wounds, and 249,000 who perished because of disease. Contrast with this the statement of German casualties up to January 31, 1917, in which 929,116 were reported to have been killed in action or to have died from wounds, while only 59,230 died from disease. According to Surgeon-General Gorgas, the death rate of our American forces of over 1,000,000 men on March 11, 1918, was at the rate of ten per thousand, while a few years ago the Japanese mortality rate of 20 per thousand was hailed as a remarkable achievement.

Linked with human health is animal health. Veterinary science has progressed with medical science. In the Boer war there was a loss of over 50 per cent among the army horses. In the present war the loss has been reduced to somewhat less than 10 per cent. Laboratory research is assuming a definite and perma-

nent place in military quarters. Vaccines, sera, antitoxins are becoming as vital to the health and welfare of the military forces as the daily rations.

Because of the intimate relation of the domesticated animals and their products to the food problem, the veterinarian has a high function to perform in conserving their health. In Belgium, Serbia and Roumania there is now a practical exhaustion of these animals. Germany has acquired these animals in her characteristic way and has therefore been able to conserve her own stock for a longer period. According to the Food Administration, the allies have reduced their herds and flocks 45,787,000 head, while Germany has reduced her supply about 18,000,000 head. Neutral nations show a total net reduction of 1,412,000 head. There is thus represented a loss of about 65,000,000 livestock in Europe, without taking into consideration Austria, Turkey and Russia, which, if included, would doubtless bring the total to over 100,000,000. The total number of cattle, sheep and swine now in the United States is estimated at about 187,000,000. This makes a striking comparison with the depletion of 100,000,000 animals in Europe with its larger human population. When it is considered that the animals still alive are doubtless in poor condition involving a reduction in live weight and a limitation in their products, it is obvious that the animal resources of Europe have been very considerably diminished.

The result is obvious, an ill-nourished population, human and animal, induces ill-health. In the long run the strength of a nation and its armies depends upon Health. P. A. F.

## OUR DUTIES

At no time in the history of our country has the veterinary profession been confronted with more serious problems than at present. All conditions, especially those affecting the food supply, have changed since the outbreak of the present great world conflict and since our participation in the war the conservation of the food supply became the key note of the leaders. It is rightly said that food will win the war and while this slogan is used in a figurative way, nevertheless the outcome of this great struggle is greatly dependent on our ability to provide food for our army and the armies of the allies. At the same time the preservation of our re-

sources and especially of our livestock industry must not be lost sight of.

For many years to come after the conclusion of peace the depletion of livestock in all countries in Europe will continue to make them dependent upon outside sources for their meat food. From the present outlook the United States and Argentina will be especially called upon to make up the deficiency created in European countries. The great demand for foreign shipment resulting in a marked increase in value of all livestock brought about a natural tendency among the breeders and stockmen to immediately realize the profits and disregard to some extent the future as far as the supply of livestock is concerned.

For this and many other reasons it is obvious that it is the duty of the veterinarians to enlighten stock owners of the necessity to maintain their breeding stock at a maximum and to conserve the health and quality of the animals. All means and precautions should be taken to guard against losses from diseases and the authorities should conscientiously enforce all measures by which it is possible to guard against the spread of diseases.

In this regard the occurrence of sporadic diseases among the livestock is of minor importance when compared with those scourges which are responsible for the death of thousands, yes, hundreds of thousands of animals. It must also be considered that the veterinary profession has been considerably depleted from calls to active service with our armies and from the present outlook this will continue for some time to come so that those remaining at home will be called upon to cover larger areas and increase their activity accordingly.

There should be no slacking on the veterinarian's part and unless he realizes that it is his patriotic duty to assist with all his ability in the conservation of livestock he fails to do his bit.

A. E.

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—The semi-annual meeting of the Veterinary Medical Association of New Jersey will be held July 11 and 12 at the Hotel Marlborough, Asbury Park, N. J. Visiting veterinarians will be welcome and a very successful meeting is anticipated.

—Dr. M. H. Rhoades, formerly stationed at Oklahoma City, has resigned from the Bureau of Animal Industry service to engage in farming and the production of livestock near Fort Collins, Colo.

# *SERUM TREATMENT OF CANINE DISTEMPER

A. Slawson, New York, N. Y.

Canine distemper has long been held in great respect by those whose dogs have been brought into contact with it, but its ravages have not dampened the ardor with which dog lovers have gone on developing the various breeds in which they are interested. Also, most individuals who have lost their pets from this disease have come back within a short time to give dogs another trial. In fact, the breeding of dogs has gone on apace so that in spite of the large mortality annually from the dog plague, there are today in this country more dogs of the various breeds developed to a higher degree than ever before. Such is the effect which losses from distemper have had upon the lovers of dogs. It is no wonder then that those whose dogs have suffered from this scourge should look forward with relief to any treatment which offers a greater measure of success than any used heretofore.

It was my fortune first to become familiar with dog diseases in October, 1901, while in the employ of the late Dr. Thomas G. Sherwood of New York City, and my interest in dogs has been intensified yearly up to the present time. The treatment of dog distemper from my own knowledge, namely from 1901 to 1912, was principally along general medicinal lines, combined with painstaking nursing. Everyone here knows what that means. No prognosis was certain. After laborious days and nights, especially with toy breeds, and highly inbred dogs, the majority of cases terminated fatally. In my opinion, a conservative estimate of recoveries, counting all breeds, would be 40%. When a case was diagnosed, even in the early stages, it was obliged to run a fairly constant course, becoming gradually worse until the third or fourth week, when a convalescent period of two weeks, more or less, would take place. It was quite safe to say, if the dogs survived the severest stages, during the third or fourth week, they would recover, provided no complications or sequelae resulted. The gist of this summary is that the treatment of canine distemper was unsatisfactory alike to veterinarian, client and patient, for I am sure could the latter have spoken, he would have told us so. This ap-

*Presented at the 54th Annual Meeting of the American Veterinary Medical Association, Kansas City, Mo., August, 1917.

plies also in the present tense where the old line treatment is still followed.

In 1911, I first met Dr. John C. Torrey, and from that time on have consistently applied vaccine and serum in the treatment of canine distemper. This has led to my using serum for curative purposes, and as a prophylactic only when exposure to the disease has taken place. As in the treatment of all disease the earlier a case is diagnosed, and the right treatment applied, the greater the chance of recovery. For this reason it is important to recognize canine distemper in its earliest stages, for it is then that the use of serum rapidly aborts the disease. Some objection may be raised to this, as it could be said that resistant dogs might recover anyway. Having kept this point in mind I will cite some cases later to prove that it is a mistake not to treat all dogs just as soon as a diagnosis has been made.

Etiology. Although some veterinarians and others still believe the cause of canine distemper has not yet definitely been fixed, from my work with vaccine and serum prepared from *B. bronchisepticus*, in the early stages of the disease before much secondary infection has taken place, I believe *B. bronchisepticus*, named by Ferry of Detroit, but found independently also about the same time by Torrey of New York and by McGowan of Edinburgh, Scotland, to be the causative agent of this disease.

Symptoms. The early symptoms should easily be recognized. One of the first signs is a hacking, dry cough which is very characteristic. This is caused by the development of the organism, first in the upper air passages, and then in the bronchial tubes. The owner will state either that his dog has swallowed something, which has lodged in his throat, and is trying to "bring it up", or that his dog has a "cold". Sometimes sneezing is noticed. The animal sleeps a good part of the time. Varying appetite and loss of weight usually occur. Skin eruptions may also be present, but they are not a constant symptom. The sclerotics are congested, at first very slightly, showing a pinkish tint. The bowels are costive or loose, rarely normal. The temperature varies considerably, from 101° to 106°, although the high temperatures in the beginning are not dangerous as they usually drop several degrees after the first reaction to infection has taken place. The pulse is rapid and wiry, varying from 120 to 160 according to the extent to which the dog is affected by the toxins in his system. The respiration is

quickened. Nervous dogs must be taken into consideration as their pulse rate and temperature may be slightly above normal. As the disease progresses the nostrils become dry and discharge a serous, then muco-purulent exudate. The conjunctivae and sclerotics become more congested and a muco-purulent discharge appears. This condition usually becomes so severe that corneal ulcers develop unless the eyes receive careful treatment. Even then the ulcers may occur. The bowel evacuations become soft, then watery, and often blood is passed with the stool, which has a characteristic offensive odor. The cough is still present, and the bronchial condition varies from a severe bronchitis to a bronchial pneumonia. Streptococcic stomatitis or streptococcic pneumonia occasionally complicates the disease. Chorea or partial or complete paralysis may appear at any time during the course of the disease. Occasionally in dogs, as is usual with cats, the disease is confined to the head, that is to the upper air passages, the nose being dry and the eyes affected, but no loose bowels occurring; constipation being the order. Sneezing and snuffling is noticeable. However, most times the toxins of *B. bronchisepticus*, and secondary invaders, eventually break down the resistance of the body, and the disease becomes generalized.

When I first began the treatment of distemper with biologics, I pursued the old line methods in conjunction with the vaccine and serum. If the temperature was high febrifuges were given from the beginning, and for dysentery the usual medicines were prescribed. The vaccine treatment meant repeated injections and visits but with the advent of Dr. Torrey's serum the treatment became simpler and the results were better. Large or small dogs received 5 c.c. of the serum every other day for three doses. Occasionally four doses were given. In the three years—1913 to 1916—outside of the cases in my practice I treated one hundred cases of various breeds of dogs, of which I have no full records. They were dogs belonging to several dog exchanges in New York City. The results were not satisfactory because little care was given the dogs in spite of repeated cautioning. These cases I have thrown out because a record of them would not be fair to the serum. If in mid-winter a man is told to put a jacket on a dog, and this is not done, if a dog is allowed to run about with a beginning of bronchial pneumonia when the owner has been warned to keep the animal quiet, if a dog is allowed to remain on a wooden or stone floor

without protection, exposed to constant drafts when he should be kept off the floor, and if the right kind of nourishment has not been given regularly, then the man and not the serum is to blame if the dog does not recover. The best results are obtained when the animal is taken care of, and instructions followed implicitly.

As stated before, I had been accustomed to the old line treatment of distemper, on which account it took some time to adjust my treatment to the use of serum. From 1912 to the summer of 1916, I used first vaccine, and shortly after the serum prepared by Dr. Torrey. While the serum was efficacious from the start, toward the end of the period mentioned the best results were obtained. In "Studies in Canine Distemper", by J. C. Torrey, Ph.D., and Alfred H. Rehe, published in January, 1913, in the *Journal of Medical Research*, the way in which Dr. Torrey began his researches is discussed. The work was first undertaken in 1908 by Dr. Oscar Teague on a fund raised by the late Dr. T. G. Sherwood, but due to Dr. Teague's departure for the Philippines the work was soon interrupted and discontinued until 1910, when as a result of the cooperation and financial assistance of the Continental Field Trial Club and others, a systematic investigation of canine distemper was begun. Dr. Torrey carried on his work until the summer of 1916. As other matters in the department of experimental pathology at the Cornell Medical College in New York were occupying his time, and as he had completed the work he had in mind when the investigation was first undertaken, he discontinued the preparation of the serum. Dr. Torrey's serum was then taken over and prepared by E. R. Squibb & Sons, 80 Beekman Street, New York City. The serum having become indispensable to me in the treatment of distemper I continued using their serum with better results than before, the two reasons for this being the higher potency of this serum and a better understanding of how to use it.

After making a diagnosis I inject from 3 to 7 c.c. of serum according to age and breed of the dog. Only puppies from two to four months old are given 3 c.c. All small breeds over six months of age, such as Pomeranians, Pekingese, Japanese spaniels, French bull dogs, Boston terriers, etc., are given 5 c.c., larger dogs are given 7 c.c. Three doses of serum are given two days apart. More than three doses are rarely necessary. No more than four doses should be given. The serum cannot safely be given *ad libitum*. It is important not to lose sight of this point. It takes strength to

absorb the serum and care must be taken not to weaken the animal. Moreover, if antibodies enough have not been introduced into the system by three or four doses of serum, sufficient, together with those produced by the body itself, to effect a favorable change in the condition of the animal, then it may be said that the blood has reached a state of negative phase, in which case nursing and medicinal treatment should be followed. Occasionally in these cases leucocyte extract is of value. Except in very high temperatures, 107° and over, I give no antipyretics in beginning the treatment. If the temperature remains 105° the day following the second dose of serum, febrifuges may be given. If the bowels are loose and remain in this condition after the third dose of serum has been given, which is rare, anti-diarrhetics may be prescribed. With the first dose of serum strychnine sulphate is prescribed in doses of 1/500 to 1/200 gr. two to three times daily, according to the age and size of the dog, in order to keep up arterial tension. In these doses this drug may be given to dogs for several weeks without danger of a cumulative action. This is very important as the heart muscle is weakened as a result of the action of the combined toxins of the various organisms and over-stimulation from too large doses of strychnine might result in collapse of the heart. With proper attention this can be avoided.

The best diet in cases that refuse nourishment is raw eggs and milk, the quantity given depending on the size of the dog and the condition of his stomach. Much of this food is absorbed through the lacteals. The pouring of a constant stream of chyle through the receptaculum chyli, and as lymph through the lymphatic glands and vessels aids in keeping up a supply of lymphocytes, which are constantly needed to replace the rapidly worn out polymorphonuclear types. Of course, other foods may be given according to appetite and habit of feeding the animal, but the importance of a raw egg and milk diet should not be forgotten. The dog should be kept as quiet as possible, and the owner warned not to play with him, especially during the treatment even though the animal appears brighter, as exercise of any kind taxes the heart, and keeps the temperature up. After the third injection of serum these precautions should be carried out for fully two weeks, and the animal should not be bathed during that time in order to prevent chilling. In the fall, winter and spring a flannel jacket should be kept on the dog from the beginning of the treatment,

and care taken not to let him get wet from rain or snow, and to keep him dry and warm, so that the danger from bronchial pneumonia may be minimized.

If the serum treatment is carried out according to the foregoing directions, canine distemper becomes a disease easy to treat with corresponding satisfaction as stated before alike to veterinarian, client and patient. In most cases the symptoms begin to disappear after the second injection of serum, in a less number after the third injection. This is seen in the disappearance of fever and a clearing or whitening of the sclerotics. Within a week the dog is on the road to recovery, and at the end of two weeks is practically well. A temperature of one or two degrees may go on for two or three weeks after this, but it is unimportant. Thus the disease, instead of running its course of six weeks, is shortened to two weeks. With ordinary care the eyes come out beautifully, corneal ulcers being conspicuous by their absence. Nervous lesions are prevented, nervous symptoms seldom developing. From forty per cent of recoveries under old treatment, eighty to ninety per cent may be expected under the new. Occasionally, several days after the serum treatment has been completed, the owner will state that although his dog appears brighter and eats well, the cough is still present. In those cases in which deep-seated bronchitis or bronchial pneumonia exists, when the animal is first presented for treatment, the cough is apt to continue, with varying degrees of severity, for two or three weeks, and it should be remembered and explained to the owner that although the serum treatment destroys the organisms in the bronchial tubes, deep-seated congestions do not clear up at once. The fact that good has been done is shown by the improvement in the dog. In such cases expectorants may be given, but I wish to warn against the use of these until three days after the last dose of serum has been injected. My reason for this is that shortly after the first dose of serum is injected a marked destructive action takes place in the mucous membranes of, and the lung tissues bordering on, the bronchial tubes, due to the action of the phagocytes on *B. bronchisepticus*. While this is going on resolution of the congested areas takes place rapidly and any drug eliminated through the bronchial tubes may act as an irritant and check the activity of these leucocytes, thereby increasing the congestion and the danger of its spreading to contiguous lung tissue. By waiting a few days, until after the last dose of serum

has been injected, expectorants may be given without interfering with the specific action of the serum, and the best results from the use of this class of drugs may then be expected. The reason attributed by me to the satisfactory action of the serum is first its specific action on *B. bronchisepticus*, and, second, the inherent bactericidal power of all serum, which is of the greatest aid in overcoming secondary infection.

The following cases have been treated with serum under my personal care, eighty-four of this number during the year just closed:

| Breed | Number Treated | Recoveries | Deaths | Percentage of Recoveries |
|---|---|---|---|---|
| American foxhound | 1 | 1 | | |
| Boston terrier | 10 | 9 | 1 | |
| German shepherd (police dogs) | 15 | 10 | 5 | |
| Airdale | 3 | 3 | | |
| Maltese terrier | 7 | 5 | 2 | |
| White Spitz | 3 | 3 | | |
| Irish terrier | 2 | 2 | | |
| Pointer | 11 | 11 | | |
| Setter | 15 | 14 | 1 | |
| French bull | 1 | 1 | | |
| Fox terrier | 5 | 4 | 1 | |
| Japanese spaniel | 5 | 2 | 3 | |
| Dachshund | 2 | 2 | | |
| Pekingese spaniel | 24 | 22 | 2 | |
| Water spaniel | 2 | 1 | 1 | |
| Poodle (French) | 3 | 3 | | |
| Pomeranian | 2 | 2 | | |
| Chow Chow | 2 | 2 | | |
| Russian wolfhound | 4 | 3 | 1 | |
| Bull terrier | 1 | 1 | | |
| Mongrel terrier | 2 | 2 | | |
| Collie | 1 | 1 | | |
| Angora Cat | 1 | 1 | | |
| Total | 122 | 105 | 17 | 83.6% |

All deaths except in the Japanese spaniels occurred in cases neglected by their owners in the beginning. The wolfhound that died had a temperature of 107.4 with a bronchial pneumonia when first treated, and lived for three days while the treatment was being given, his temperature dropping to 105°, but rising to 108.4 when death occurred. The case of the Angora cat is interesting. He was ten months old, and had been snuffling and sneezing for one month when first seen. He had not been altered. He was affected with sarcoptic mange about the head, ears and neck. The treatment for mange was begun, and three days later the cat was

given ether and altered. A Boston terrier puppy was in a cage next to the cat and had been well for four weeks when the cat was admitted. In five days the puppy began to snuffle and cough, showing unmistakable signs of distemper. He was at once given 3 c.c. of serum, followed by the same amount in two days, and 5 c.c. two days after that. The cat was given two doses of 3 c.c. each. Both cases made uneventful recoveries.

Not wishing to be hasty in administering the serum I have occasionally had people return with their pets two to three days after having made an examination. In doubtful cases this is the best method to pursue, and in these very early cases the delay can work no harm to the patient. Two doubtful cases in point are two fox terriers. One case had a normal temperature and no cough, but the sclerotics were pink and the pulse 130. The dog was sleepy and refused food, but the bowels were open as castor oil had been given. The treatment was explained to the owner, and he was advised to call again in two days' time. However, he did not have time to do this, so the treatment was begun at once. All symptoms had begun to disappear when the dog was presented for the second injection of serum two days later. The dog made an uneventful recovery. The other fox terrier brought in the same day was a doubtful case. He had been costive a week and had had several doses of castor oil, and had varied in spirit and appetite. The sclerotics were pink. Temperature 101, pulse 120; he had had a slight cough a few days before this, but this had disappeared. The serum treatment was explained to the owner, some tablets given for the dog, and the owner advised to return the dog in three days. This was on June 2nd, but the dog was not brought back until June 20th, eighteen days later, when he showed unmistakable, but not severe symptoms of distemper. The owner explained the dog had shown improvement from the medicinal treatment, and that he thought recovery would take place. The serum was then given, and the dog made a rapid, uneventful recovery. In this case the animal showed great resistance to the disease. Another resistant case occurred in a Boston terrier. He was first seen December 16th and 17th, temperature 102, pulse 140, varying appetite and spirits, and loss of weight noticed. Serum not desired by owner at that time. Called again on January 29th, over five weeks later. Condition of the dog the same as before. The serum treatment was given and the dog made a rapid uneventful recovery.

Another fox terrier had all the symptoms of a case in the early stages of distemper, the bronchial symptoms being especially severe. Tablets given and serum treatment advised. This was on December 7th and 8th. Serum not desired by owner. Called again on December 25th. Dog no better and serum treatment given. He seemed to make an uneventful recovery as the owner told me so over the telephone. However, I was again called to see this dog on March 12th. The dog showed marked dyspnea, but his general condition seemed fair, the distemper symptoms having disappeared. The owner stated that the dog had begun the labored breathing five weeks earlier, and it had gradually grown worse. Pulse 160 and wiry, temperature 101. It was difficult to make a diagnosis on auscultation and percussion in this restless dog. The sound of the heart action was so dull, however, and the mucous membrane so anemic, that I ventured a diagnosis of hydropericardium, with danger of collapse of the heart, and advised at the same time that the animal be destroyed. An autopsy was performed. All organs with the exception of the lungs were normal. Both lungs showed numerous areas of firm caseation, varying in size from a pea to a hazelnut. The mediastinal and bronchial lymph glands were normal, as were the lymph glands throughout the body. This was not a case of tuberculosis, but very likely a case of streptococcic infection. In this case had the serum treatment been given when the dog was first seen it is probable that he would have overcome this secondary infection. This shows with the other cases mentioned that it is best not to count on the resistance of a dog to combat the disease, but to give the serum treatment at once. One point more, when the serum treatment is once begun it should be completed, as one dose of serum is not enough to effect a cure. In only two cases, a Dachshund and Maltese terrier, were two doses given as the heart action of these dogs was so weak that I stopped the serum and continued the treatment along general lines. However, these dogs also made rapid recoveries.

From the foregoing results it seems to me that the serum treatment of canine distemper has come to stay. It appears to be only a matter of a short time before it will be more generally used than at present. To me it has meant an ever widening circle of satisfied clients. I shall continue to urge the use of the serum whenever a case of canine distemper is presented to me for treatment.

## Discussion

Dr. Quitman: Is the Torrey serum a prophylactic serum?

Dr. Slawson: It is a curative serum.

Dr. Quitman: Doesn't he get out a prophylactic serum?

Dr. Slawson: No. I think that was said at first. I said I gave it for curative purposes, and as a prophylactic only when exposure has taken place. I do not think any serum I have heard of is prophylactic. I mean it will protect them if they have been exposed, but then they should be removed so that they do not undergo further exposure, say after a period of a couple of weeks. I think the immunity wears off then. In other words the serum confers a passive and not an active immunity.

Dr. Quitman: I wish to compliment Dr. Slawson on his excellent paper and the great thoroughness of it. It is one of the best papers I have ever heard on this disease. As to this prophylactic serum, it is probably an early label that was gotten out, because I know I have a package marked for prophylactic purposes, and I thought when the package was sent me I was to receive an inactive serum, and consequently never used it. In a floating city practice one does not commonly have use for the prophylactic serum. With Dr. Slawson's explanation of this serum, I am now anxious to try it.

Dr. Pierce: What fee do you charge for this treatment?

Dr. Slawson: I charge my fee according to the client. A poor person needs treatment for his dog as well as a rich man. Whatever may be my fee I charge that plus one dollar for each injection of serum. I cannot afford to open a package of serum, because it is expensive, and charge less than that. I make them understand my fee is so much, plus three dollars for three injections of serum. Sometimes where there is a little more profit one way or another, you can give a poor person a lower rate. I think you have to charge three dollars for the serum to come out even in all cases.

A Member: There are a number of people who have serums on the market for canine distemper. Do you know anything about them?

Dr. Slawson: I know nothing about them. The only reason I have been using this serum is because I had worked on it before I knew it was going to be taken up. Dr. Torrey worked without any thought of compensation. It was purely scientific work and work in the laboratory for the purpose of helping people. There is a division of the Cornell Medical College in New York City and I got to know Dr. Torrey there. It was only because in his earlier work he wanted somebody to use his vaccine and serum in the treatment of distemper that I got to work with him.

A MEMBER: How is it put up?

DR. SLAWSON: It is put out as a serum in bottles of 20 c.c. each.

A MEMBER: How much of an injection do you give?

DR. SLAWSON: Three injections, 5 c.c. each, sometimes four injections.

DR. PIERCE: We very often have dogs brought in which are suffering from chorea or paralysis to a greater or less extent, and I would like to ask what success has been had in those cases that had already developed?

DR. SLAWSON: The treatment is unsatisfactory. I had several cases that cleared up, but that has not been true of all of them. In those cases, you can be pretty sure, unless the dog is nearly well when these symptoms appear they will not do well. Most of them die. I have used a preparation of Inula and Echinacea put up by Lloyd Brothers of Cincinnati in these cases. I have used that intramuscularly. I had one case in which I felt I did not wish to use the serum. It was pretty well recovered and seemed more rheumatic than paralyzed. I gave this dog three injections of five c.c. each, two days apart, intramuscularly. I gave it in the group of muscles behind the scapula instead of the gluteal muscles as recommended. This dog showed no particular response to this treatment. I gave it in this manner because I gave it once to a dog in the gluteal muscles. This was in a case of autointoxication which had convulsions, which stopped, but when the dog got home he was paralyzed. I thought perhaps it was due to pressure on the sciatic nerves, and then an abscess developed. After treating this dog one month he had to be destroyed. After that I have always injected it in the muscles back of the shoulder. Another case was a little Pekingese with chorea. I gave it to him in three c.c. doses for three injections, and he seemed to do very well, but I did not follow it up.*

Another severe case of chorea I had was in a Boston terrier to which I gave the same preparation (Inula and Echinacea) and he did very well. It was a case where the head would strike the ground, he was so bad; the woman was delighted with the treatment, but a month later she came back and said the dog was the same as before. I felt there was nothing specific about that treatment and I was sorry I had not used the serum.

*A year later, April, 1918, I learned this little dog did not recover.

—Dr. Don McMahan has removed froom Calvin to Fargo, N. D.

—Dr. J. H. Webster has removed from San Francisco to Coalinga, Calif.

# INVESTIGATIONS ON BLACKLEG IMMUNIZATION*

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INTRODUCTION. For a long time there has been prevalent among the cattle in the western part of Japan an acute enzoötic disease commonly known as "Tachi". No attempt had been made to describe the disease until 1893, when the "Tachi" disease in Yamaguchi Prefecture was first referred to by K. Shiraishi, who claimed to have found, on microscopic examination of muscles from an affected cow, together with a variety of organisms, a spore-bearing bacillus morphologically similar to that of blackleg and who suggested that the "Tachi" disease might be identical with the blackleg prevalent in Europe and America. I was also informed personally by Professor G. Suto, who was for a few years Professor in the Agricultural College at Sapporo, that he had seen a case of blackleg in sheep during his tenure of office there.

It was only in the year 1897 that systematic investigations of the "Tachi" disease were first undertaken by the writer. The material used for that purpose was some pieces of dried flesh from an affected animal sent from the above-mentioned prefecture.. Besides these, pieces of dried blackleg flesh sent from Germany in 1899 by Professor H. Tokishige, who was then studying in Professor Kitt's Laboratory at the Royal Veterinary College in Munich, served as the basis of our investigations. The following is the résumé of my investigations (1905).

1. It may be safely stated that the "Tachi" disease is identical with the blackleg prevalent in foreign countries.

2. The experiments with guinea pigs and with cattle in some infected districts show that the "Tachi" vaccines prepared according to Arloing, Cornevin, and Thomas may be successfully used in practice.

3. The "Tachi" immune-serum prepared by hyperimmunization of cattle has a protective, and to a certain extent also a curative action when used in time, as stated by Kitt, Leclainche-Vallée, and Arloing.

*Bulletin of the Central Veterinary Medical Association, April, 1918, Tokyo, Japan.

Official statistics of blackleg in this country for recent ten years (1907-1916) are given below:

| Years | 1907 | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total | 120 | 171 | 159 | 128 | 181 | 191 | 209 | 172 | 186 | 165 |

A Brief Review of Existing Methods of Immunization Against Blackleg. It was Arloing, Cornevin, and Thomas, who, in 1880, first discovered that animals could be protected against blackleg by a subcutaneous injection of minimal doses of fluid from a blackleg tumor and also by an intravenous or intratracheal injection of the virus. These methods, however, were abandoned as being too dangerous or too complicated to be of practical value. In 1883, the French scientists recorded a method of vaccination which has ever since been practised largely in France, Switzerland, and other countries. In this method two vaccines of different virulence are employed: the first or weaker vaccine is prepared by exposing the dried juice obtained from a blackleg tumor to a temperature of 100°-104° C. for six hours, and the second or stronger vaccine by exposing it for the same length of time to a temperature of 85°-90° C. The under surface of the tail is the seat of inoculation, the operation being attended with some difficulty owing to the density of the subcutaneous tissue of the part.

Kitt, in 1888, published a simplified method of vaccination in which a single vaccine is prepared by heating virulent muscle powder at a temperature of 100° C. for six hours in a steam sterilizer. The vaccine is injected in the shoulder region where the skin is loose. This vaccine has been used largely in Bavaria.

Nörgaard, of the Bureau of Animal Industry, U. S. Department of Agriculture, 1896-1897, also prepared a vaccine, which, by a single inoculation, will produce practical immunity, and which since then has been used extensively in the United States of America. Like Kitt's vaccine, this is also muscle-powder heated in an oil bath having a temperature of 93°-94° C., the site of injection being the side of the neck or chest.

In Thomas' method, a bundle of threads impregnated with virulent muscle-juice from an infected animal—*fils virulents* in French, or *blacklegine* in English—is introduced with a special inoculation-harpoon under the skin of the tail where a local culture of blackleg organism will result. It is reported that he later adopted two kinds of attenuated virus for the preparation of *fils virulents.*

Detre prepared from Lyons vaccine a liquid vaccine by separating spores and toxin from muscle-fibers and coagula of albuminous matters and then by mixing them in hypertonic saline solution.

Since all the vaccines mentioned above, except that of Thomas, consist of dried muscle-juice or muscle-powder from an infected animal attenuated by heating, they all have the following common disadvantages. First, there is a considerable variation of the amount, virulence, and resistance to external influences, especially to heat, of the virus (spores) in the blackleg material from which the vaccines are prepared; second, the effect of attenuation upon the virus accordingly varies greatly in different lots of the material, which is the principal cause of irregularities in the immunizing action of the vaccines prepared; third, an accurate standardization of the vaccines is very difficult; fourth, contamination of the vaccines, as will be seen from the various methods of preparation in vogue, is unavoidable, and this may result in the occurrence of complications; finally, losses from vaccination and insufficient immunity are occasionally observable.

For the reasons just described, several investigators have made attempts to obtain a pure and uniform vaccine from artificial cultures of the blackleg organism. Kitasato (1889) was the first to experimentally immunize animals with a pure culture. He stated that guinea pigs could be immunized by an injection of a broth culture, over two weeks old, or of a fresh virulent broth culture heated for 30 to 40 minutes at a temperature of 80° C.

In 1894, Kitt demonstrated that sheep and cattle also could be immunized by an injection of a less virulent broth culture. In Bavaria and Austria this method was for a time practised. Kitt later found that this method was not dependable, because by leaving the culture to stand for several weeks, or by making frequent transfers the blackleg organism gradually loses its virulence, which itself varies considerably with different strains, an accurate dosage being thus quite impossible. The same author also stated that an old blood-broth culture, left for several weeks, is inoffensive so that sheep could be immunized by an injection of 1-2 c.c., while an injection of 0.2 c.c. of a fresh culture kills sheep; and, an accurate dosage being impossible, this is also impracticable. Furthermore, Kitt immunized sheep by an injection of minimal doses of a dried blood-broth culture from which was prepared a vaccine in tablet

form by mixing starch soluble in water. He had also observed that vaccines prepared by heating the dried culture in glass tubes in a steam sterilizer at 97° or 100° C. for five to six hours confer immunity on sheep.

Leclainche-Vallée used a direct blood culture from an affected cow, and also a pure culture in horse blood, for the preparation of vaccines; that is to say, they dried the culture in an incubator, divided it into two portions, heating one at 102° C. for seven hours, and the other at 92° C. for the same length of time: they were able to immunize guinea pigs by successive injections of these two vaccines. The French authors later employed a five to eight days old Martin broth culture (spores) heated at 70° C. for two hours, which by a single injection of 2 c.c. confers solid immunity on calves.

A few years ago the same scientists mentioned a new method of single vaccination in which is used a pure culture of the blackleg organism attenuated by long cultivation at a high temperature (42°-43° C.). This method has since been practised largely in France.

In 1911, Foth recorded the preparation of new vaccines. The powder vaccine ("A" type) is prepared by heating, at 93° C. for seven hours, blackleg spores grown in a peptone-liver-broth with addition of minced meat, and by precipitating it with absolute alcohol; this vaccine is rich in spores. The alcohol precipitate of the filtrate, obtained by passing through a thick layer of stamped filter-paper pulp of a virulent culture, may also be used as a vaccine; it contains a small number of spores ("F" type). A single injection of the powder vaccine or of the filtrate-precipitate confers on guinea pigs, sheep, and cattle solid immunity. Repetition of the injection—twelve days later—of larger doses increases the immunity. With cattle and sheep the ear is the seat of the first inoculation and behind the shoulder for the second. A subcutaneous injection of small doses of a filtrate-powder solution on the ear, and at the same time the introduction of threads impregnated with spore-powder solution under the skin of the tail, also confer on sheep and cattle solid immunity. The alcohol precipitate of the germ-free filtrate obtained by passing through a bacterial filter of a virulent culture again confers immunity on guinea pigs ("F'" type). Foth immunized ten sheep by inoculation with "A" type vaccine alone, or by a combination of threads and "F" type vaccine, and one cow by the latter method.

In Poel's method, cotton-wool soaked in a virulent pure culture and dessicated afterwards, is introduced under the skin of the tail. In Holland, 1904-1906, 21,329 calves were inoculated, with an inoculation loss of 1%-1¼%.

In addition to the foregoing, attempts have been made to immunize animals by an injection of metabolic products of the blackleg organism. As early as 1888 Roux demonstrated that an intraperitoneal injection of a broth culture, over two weeks old, heated at 115° C., or of the filtrate of the culture, or of a subcutaneous injection of the filtrate of the blackleg exudate, confer immunity on guinea pigs.

A few years later, in 1894, Dünshmann also stated that an injection of the filtrate of the tissue-juice from an affected animal confers immunity on guinea pigs.

Grassberger and Schattenfroh made a study of the blackleg toxin and stated that while it was difficult to immunize guinea pigs with the toxin, rabbits, cattle, and sheep could be easily immunized in this manner; the result in practical use, however, was unsatisfactory, since out of 306 inoculated cattle 23 died of intoxication, while 40-50 were severely affected. The same authors then demonstrated that an injection of a mixture of toxin and antitoxin serum conferred immunity on rabbits, sheep, and cattle: in 1903, 206 cattle in a blackleg district were inoculated with the mixture (12-20 c.c.), with no effect on the animals except a very slight local reaction; the report on natural losses was lacking.

Foth's germ-free filtrate has been already mentioned.

Schöbl (1910-1911) studied the aggressin immunity in blackleg and demonstrated that a subcutaneous, intraperitoneal, or intravenous injection of 0.5-1.5 c.c. of germ-free aggressin, obtained by centrifugalization of the edematous fluid from an affected part of guinea pigs which had died of blackleg, confers immunity on guinea pigs. He then proved that the aggressin obtained from cattle in doses of 5-10 c.c. also confers immunity on calves when used subcutaneously or intravenously.

That the serum taken from the hyperimmunized animals has a protective and even curative action had already been demonstrated by Kitt, Arloing, and Leclainche-Vallée. The latter authors stated that an injection of the immune serum and virus, mixed or separately at the same time, did not confer immunity on animals but that successive applications of the serum and virus proved a practi-

cable method of immunization (10-20 c.c. of horse serum injected in the shoulder region, 5-8 days later 0.5-1.0 c.c. of pure culture attenuated by heating at 70° C. for three hours subcutaneously at the same place, neck, ear, or tail).

Grassberger and Schattenfroh employed for immunization the serum of cattle hyperimmunized first with toxin and then with virulent material, with unsatisfactory results. They also used a neutralized mixture of toxin and antitoxic serum (5-10 c.c.): in 1904 over 4500 cattle, in Austria, were inoculated without direct loss; of these 78 died of natural blackleg.

Aërobic Cultivation of the Blackleg Organism. For the preparation of blackleg vaccines on a large scale from pure cultures it is essential to consider how to obtain, in the simplest way possible, as much virulent culture as may be needed. Nothing but an aërobic culture of the organism will properly serve this purpose. So let us first review the methods of aërobic cultivation of strict anaërobes to which the blackleg organism belongs, as worked out by many investigators up to the present time.

Kitt was the first to grow aërobically the blackleg organism; for this purpose he used a ½-1 liter flask filled with broth, inoculating a comparatively large quantity (0.5-1.0 c.c.) of a fresh broth culture or a small mass of an agar culture, but this method is not always successful.

I also proved that the organisms of blackleg, malignant edema, and tetanus could be grown in a tube, with a neck in the middle part, up to the neck filled with broth. In his work on immunization experiments against braxy, Prof. Tokishige recorded that my method was also successful for the cultivation of the braxy organism.

Kitt later stated that the blackleg organism develops luxuriantly in broth with the addition of sterile blood or fresh muscle (a pigeon's breast muscle) and the culture thus obtained is highly virulent.

Recently many other investigators were able to grow strictly anaërobic organisms in broth by simply adding pieces of animal or vegetable tissues. Smith published a method of aërobic cultivation of anaërobes which consists of pouring broth into fermentation tubes and adding sterile pieces of an animal organ. Hibler cultivated the organisms of tetanus, malignant edema, and blackleg in culture-media with sterile blood or sterilized minced brain.

Leclainche-Vallée used pure blood for the cultivation of the blackleg organism. Elers employed serum coagulated by heat for the same purpose. Tarrozzi demonstrated that the organisms of tetanus, pseudotetanus, and blackleg grow well in ordinary broth with sterile pieces of an organ or a tissue. Wrzosek confirmed Tarrozzi's experiment, furthermore stating that vegetable tissues, potato for example, and sterilized animal tissues could also be used. Harrass mentioned that *Bac. butyricum, Bac. botulinus, Bac. chauvaei* and *Bac. edematis maligni* grow aërobically in media prepared from finely minced calf's liver or brain. Pfuhl also recommended the broth made from liver. Hata not only confirmed the investigations of Smith and Wrzosek but also proved an ordinary broth with certain reducing agents, especially sodium sulphite, to be fit for the aërobic cultivation of anaërobes, addition of a small quantity of serum favoring the production of toxin, for instance in the case of tetanus.

After trying all the various methods mentioned above I found an ordinary peptone-beef-broth containing plentiful small pieces of boiled meat or liver to be one of the most suitable and simple media for aërobic cultivation of the blackleg organism, and in our laboratory it is called "meat-piece or liver-piece broth". The preparation of the broth is as follows: as may be required by the quantity of culture obtainable, use test tubes, or flasks of ½ or 1 liter; first put a number of small pieces of previously boiled lean beef or calf's liver into each vessel, so that a layer a few centimeters thick of the pieces is formed. Next pour the usual quantity, or better, a little more than the usual quantity, of the ordinary broth into the vessels, plug them with cotton-wool, and then sterilize the vessels and their contents in a steam sterilizer. It is advisable to heat them again in a steamer immediately before use and then to cool them quickly. Usually a large loopful of blackleg exudate or culture (broth or agar) is inoculated into each tube or flask. After incubating for about 24 hours at 37° C. there occurs a general cloudiness of the medium, a considerable amount of gas being produced. On microscopic examination of the culture the growth of the blackleg organism is demonstrated. After a few days flocculi form, which fall to the bottom, and the medium gradually becomes clearer, and a luxuriant spore formation is observed which will be complete after five to ten days' incubation. The culture thus obtained is as highly virulent as anaërobic culture, so

that 0.1-0.2 c.c. of the culture generally kills guinea pigs in 10-24 hours and 0.1-0.5 c.c. calves within three days. To preserve a culture rich in spores it is advisable to add an equal part of 60-80 per cent glycerine, which proved excellent for the purpose, since no alteration in the virulence of the preserved culture was observable even after lapse of 10 months. The following are the results of inoculation tests on guinea pigs:

| Guinea pig No. | Weight (grams) | Date of Inoculation | Culture-Media | Age of Culture (hours) | Dose (c.c.) | Result (died in) |
|---|---|---|---|---|---|---|
| 23 | 215 | Sept. 25, 1911 | Beef p. b. | 36 | 0.2 | 10 hours |
| 34 | 375 | Oct. 8, 1911 | G. p. liver p. b. | 15 | 0.1 | 26 hours |
| 38 | 305 | Oct. 16, 1911 | Pork p. b. | 22 | 0.2 | 23 hours |
| 39 | 215 | Oct. 25, 1911 | Pork p. b. | 20 | 0.1 | 10 hours |
| 41 | 415 | Nov. 6, 1911 | Beef p. b. | 36 | 0.1 | 27 hours |
| 45 | 430 | Nov. 10, 1911 | Beef p. b. | 36 | 0.1 | 10 hours |
| 56 | 310 | Dec. 4, 1911 | Beef p. b. | 40 | 0.1 | 34 hours |
| 59 | 350 | Dec. 7, 1911 | Beef p. b. | 24 | 0.1 | 48 hours |
| 68 | 475 | Dec. 12, 1911 | Beef p. b. | 24 | 0.1 | 48 hours |
| 74 | 545 | Jan. 13, 1912 | C. liver p. b. | 18 | 0.2 | 55 hours |
| 75 | 485 | Jan. 13, 1912 | C. liver p. b. | 18 | 0.1 | 34 hours |
| 91 | 255 | March 6, 1912 | Beef p. b. | 17 | 0.1 | 18 hours |
| 96 | 565 | March 7, 1912 | Beef p. b. | 17 | 0.1 | 20 hours |
| 98 | 515 | March 25, 1912 | Beef p. b. | 16 days | 0.25 | 21 hours |
| 99 | 375 | March 25, 1912 | Beef p. b. | 16 days | 0.1 | 22 hours |
| 143 | 510 | May 24, 1912 | Beef p. b. | 14 days | 0.1 | 24 hours |
| 159 | 555 | June 14, 1912 | Beef p. b. | 23 days | 0.1 | 35 hours |

Immunizing Experiments with Pure Cultures Attenuated by Heat. To ascertain if practicable vaccines could be obtained from a pure culture of the blackleg organism by heating it, as done by Leclainche-Vallée, I used for this purpose pure cultures rich in spores, preserved with an addition of glycerine, as previously stated, exposing it in bottles to a temperature of 75° C. for 1 to 5 hours in a water bath; the inoculation experiments with guinea pigs proved that the cultures heated even for as long as 5 hours showed no expected alteration in virulence. The temperature was then raised to 85° C., the time of heating being for 1-3 hours, and the result of animal experiments was nearly the same as in the previous case.. The culture heated at a temperature of 90°-92° C. for 1 to 3 hours, however, was so attenuated, that 0.1-0.5 c.c. and even 1-3 c.c. of the heated culture no more killed the guinea pigs inoculated, and in the majority of the animals that were treated twice with the attenuated culture the production of immunity was proved, since guinea pigs resisted against control-inoculation, a single inoculation being insufficient.

As it was proved that two successive inoculations with the attenuated culture conferred solid immunity on guinea pigs, I have tried to immunize three calves by inoculations with the same material, with satisfactory results. No. 1 received two inoculations (10 and 20 c.c.), and No. 2 one inoculation (2 c.c.), both showing a slight local reaction and a slight increase in temperature. No. 3 was inoculated once with a larger dose (10 c.c.), the reaction also being slight; these three calves were proved to be immune against control-inoculation made after about 2-4 weeks.

In the summer of 1912, 157 cattle in Okayama Prefecture were inoculated with the heated culture with satisfactory results: 59 were inoculated twice with 1 and 3 c.c. and 98 once with 2-3 c.c., but later it was found that the uniform attenuation by heating at a temperature of 90°-92° C. of the preserved culture could not be always expected in all different bottles, so that this method has since had to be abandoned.

Immunization with a Mixture of Immune Serum and Virus. Leclainche-Vallée stated that injections of immune serum, and, a few days later, of virus confer immunity on animals treated; injections of both at the same time or of a mixture of both, however, not doing so. The truth of the first part of the statements of the French authors was confirmed in our laboratory; but contrary to the results obtained by them I found that a mixture of immune serum and virus in a proper proportion could produce solid immunity in the animals treated, reactions in the vaccination being slight.

As it was proved that an injection of a mixture of immune serum and virus conferred immunity on guinea pigs, I have tried to immunize three calves with the mixture (1-2 c.c. of serum and 0.5-1 c.c. of virus), all animals being proved to be immune against control-inoculation, as will be seen in the following:

*No. 1.*—Black and red bull-calf weighing 135 kilos.

April 30, 1912. Morning 38.7°; Evening—.
May 1, 1912. Morning 38.8°; Evening 39.4°.
2 p. m. injected subcutaneously into the right side of the thorax a mixture of 1 c.c. of serum and 1 c.c. of a strong preserved virus, incubated for one hour.
May 2, 1912. Morning 38.1°; Evening 38.7°.
A swelling the size of a hen's egg at the point of injection.
May 3, 1912 Morning 38.5°; Evening 38.8°.
May 4, 1912. Morning 38.7°; Evening 38.6°.
The swelling disappeared.
June 5, 1912. Morning 38.5°; Evening 38.8°.
12 noon, injected subcutaneously into the left side of the thorax 0.2 c.c. of a strong preserved virus.
June 6, 1912. Morning 39.1°; Evening 38.7°.

A slight swelling at the point of injection, and slight edema at the underbreast.

June 7, 1912. Morning 38.0°; Evening 38.9°.

The local swelling decreased, the edema at the underbreast disappeared.

June 8, 1912. Morning 37.9°; Evening 38.5°.

June 9, 1912. Morning 37.5°; Evening 38.6°.

The swelling nearly disappeared.

June 19, 1912. Morning 37.8°; Evening 38.6°.

11 a. m. injected subcutaneously into the right side of the thorax 0.5 c.c. of a strong preserved virus.

June 20, 1912. Morning 38.1°; Evening 38.7°.

No local reaction.

June 21, 1912. Morning 38.3°; Evening 38.5°.

June 22, 1912. Morning 38.3°; Evening 38.1°.

June 23, 1912. Morning 38.6°; Evening 38.2°.

*No. 2.*—Red and White bull-calf. Weight, 160 kilos.

April 30, 1912. Morning 38.7°; Evening—.

May 1, 1912. Morning 38.8°; Evening 39.2°.

2 p. m. injected subcutaneously into the right side of the thorax a mixture of 2 c.c. of serum and 1 c.c. of a strong preserved virus, incubated for one hour.

May 2, 1912. Morning 38.1°; Evening 38.3°.

A trace of swelling at the point of injection.

May 3, 1912. Morning 38.4°; Evening 38.7°.

No swelling.

May 4, 1912. Morning 38.6°; Evening 38.9°.

May 5, 1912. Morning 38.2°; Evening 38.8°.

June 8, 1912. Morning 38.8°; Evening 39.4°.

4 p. m. injected subcutaneously into the left side of the thorax 0.2 c.c. of a strong preserved virus.

June 9, 1912. Morning 39.0°; Evening 40.3°.

A slight swelling at the point of injection, and edema at the underbreast.

June 10, 1912. Morning 39.2°; Evening 39.1°.

The edema somewhat increased.

June 11, 1912. Morning 38.9°; Evening 39.1°.

The edema decreased.

June 12, 1912. Morning 39.6°; Evening 38.8°.

June 13, 1912. Morning 38.7°; Evening 38.9°.

June 14, 1912. Morning 38.9°; Evening 39.2°.

The local reaction entirely disappeared.

June 19, 1912. Morning 38.6°; Evening 39.6°.

11 a. m. injected subcutaneously into the right side of the thorax 0.5 c.c. of a strong preserved virus.

June 20, 1912. Morning 38.7°; Evening 39.0°.

No reaction.

June 21, 1912. Morning 38.6°; Evening 38.7°.

June 22, 1912. Morning 38.8°; Evening 38.7°.

*No. 3.*—Red bull-calf weighing 300 kilos.

May 14, 1912. Morning 38.6°; Evening—.

May 15, 1912. Morning 38.4°; Evening 38.6°.

12 noon injected subcutaneously into the right side of the thorax a mixture of 1 c.c. of serum and 0.5 c.c. of a strong preserved virus, incubated for one hour.

May 16, 1912. Morning 38.7°; Evening 38.3°.

A goose's egg sized swelling at the point of injection.

May 17, 1912. Morning 38.0°; Evening 38.7°.

May 18, 1912. Morning 38.2°; Evening 38.4°.

May 19, 1912. Morning 38.2°; Evening 38.2°.

The local swelling disappeared.

June 12, 1912. Morning 38.6°; Evening 38.9°.

12 noon injected subcutaneously into the right side of the thorax 0.2 c.c. of a strong preserved virus.

June 13, 1912. Morning 39.3°; Evening 38.6°.

A swelling the size of a hen's egg at the point of injection.

June 14, 1912. Morning 38.6°; Evening 39.0°.

June 15, 1912. Morning 38.6°; Evening 38.9°.

June 16, 1912. Morning 38.5°; Evening 38.4°.

The swelling disappeared.

June 26, 1912. Morning 38.7°; Evening 39.0°.

11 a. m. injected subcutaneously into the right side of the thorax 0.5 c.c. of a strong preserved virus.

June 27, 1912. Morning 38.6°; Evening 38.7°.

A slight swelling at the point of injection.

June 28, 1912. Morning 38.4°; Evening 38.9°.

The swelling decreased.

June 29, 1912. Morning 38.9°; Evening 39.6°.

June 30, 1912. Morning 38.6°; Evening 38.6°.

The swelling disappeared.

IMMUNIZATION WITH AGGRESSIN. Schöbl (1910-1911) first published aggressin immunity in blackleg. He collected edematous fluid from the affected parts of guinea pigs which had died of inoculation blackleg and injected into guinea pigs subcutaneously (intraperitoneally or intravenously) the fluid after making it free of the blackleg organism by centrifugalization in doses of 0.5-1.5 c.c., the animals being proved to be immune against subsequent injection of blackleg virus. He then demonstrated that calves also could be immunized by an injection of the aggressin obtained from a calf in the same way as in the case of guinea pigs.

In our laboratory the truth of Schöbl's statement was confirmed. Edematous fluid was collected from subcutis and muscles of a calf dead of inoculation blackleg and passed through a Chamberland filter, and the filtrate was injected subcutaneously into two guinea pigs. As a result of control-inoculation made three weeks later the production of immunity against blackleg in the animals treated was proved. Experiments were then made to ascertain if the same result could be obtained by treatment of animals with the filtrate of a broth culture of the blackleg organism. For this purpose I used a meat-piece or liver-piece broth culture, 2-3 weeks old, and obtained from it a filtrate free of the organism by passing through a Chamberland filter. The majority of guinea pigs injected subcutaneously with 0.5-2 c.c. of the filtrate proved to be immune against the control-inoculation made after 2-6 weeks. However, a mixture of the filtrate and well-washed blackleg spores was highly virulent, while the spores alone were avirulent. The

table on the next page shows the results of immunization of guinea pigs with the filtrate.

Since satisfactory results were obtained with guinea pigs, the filtrate was injected into four calves to prove if immunity could be produced also in cattle by treatment with the filtrate. One of them received 5 c.c. and the other three 10 c.c., reaction being slight. One calf died of pneumonia before control-inoculation. Three remaining calves proved to be immune against subsequent control-inoculation made 9 or 10 days later. The details will be seen in the following:

| Guinea pig | | First Injection | | Second Injection | | Control Inoculation | | |
|---|---|---|---|---|---|---|---|---|
| No. | Weight (grams) | Date (1912) | Dose of Filtrate (c.c.) | Date (1912 | Dose of Filtrate (c.c.) | Date (1912) | Dose of Preserved virus (c.c.) | Result (local swelling the size of) |
| 146 | 300 | May 29 | 0.5 | — | — | June 2 | 0.2 | Little finger's end |
| 147 | 315 | May 29 | 1 | — | — | June 2 | 0.2 | Thumb's end |
| 148 | 410 | May 29 | 2 | — | — | June 19 | 0.2 | Trace |
| 149 | 460 | May 29 | 4 | — | — | June 19 | 0.2 | Bean |
| 165 | 420 | June 22 | 0.5 | — | — | July 9 | 0.2 | Died in 24 hours |
| 172 | 715 | July 11 | 2 | — | — | Aug. 5 | 0.2 | Thumb's end |
| 173 | 685 | July 11 | 2 | — | — | July 29 | 0.2 | Trace |
| 174 | 600 | July 11 | 1 | — | — | Aug. 5 | 0.2 | Thumb's end |
| 175 | 590 | July 11 | 1 | — | — | Aug. 5 | 0.2 | Little finger's end |
| 176 | 638 | July 11 | 0.5 | Aug. 5 | 2.0 | Aug. 20 | 0.2 | No swelling |
| 177 | 495 | July 11 | 0.5 | — | — | Aug. 5 | 0.2 | Died in 36 hours |
| 185 | 465 | Aug. 6 | 2.5 | — | — | Aug. 20 | 0.2 | Little finger's end |
| 186 | 455 | Aug. 6 | 2.5 | — | — | Aug. 20 | 0.2 | Died in 24 hours |
| 187 | 615 | Aug. 6 | 2 | — | — | Aug. 20 | 0.2 | Trace |
| 188 | 575 | Aug. 6 | 2 | — | — | Aug. 20 | 0.2 | No swelling |

*No. 1.*—Red and white calf weighing about 77 kilos.

June 25, 1912. Morning 38.5°; Evening 38.7°.
June 26, 1912. Morning 38.6°; Evening 39.6°.
11 a. m. injected subcutaneously into the right side of the thorax 5 c.c. of the filtrate.
June 27, 1912. Morning 39.4°; Evening 39.6°.
A slight local swelling.
June 28, 1912. Morning 38.5°; Evening 39.2°.
A decrease in the swelling.
June 29, 1912. Morning 39.1°; Evening 38.9°.
June 30, 1912. Morning 38.6°; Evening 38.5°.
No swelling remaining.
July 15, 1912. Morning 38.7°; Evening—.
July 16, 1912. Morning 38.7°; Evening 39.4°.
11 a. m. injected subcutaneously into the left side of the thorax 0.2 c.c. of a strong preserved virus.
July 17, 1912. Morning 39.3°; Evening 39.5°.
A hen's egg sized swelling at the point of injection.

July 18, 1912. Morning 39.5°; Evening 39.6°.
The swelling same as on the previous day, appetite somewhat poor.
July 19, 1912. Morning 39.2°; Evening 39.4°.
The swelling disappeared.

On July 29 this animal was again injected subcutaneously into the right side of the thorax with 0.5 c.c. of a strong preserved virus, showing a very slight local reaction only.

*No. 2.*—White and black bull-calf. Weight, about 211 kilos.

June 25, 1912. Morning 38.1°; Evening 38.1°.
June 26, 1912. Morning 38.5°; Evening 39.1°.
11 a. m. injected subcutaneously into the right side of the thorax 10 c.c. of the filtrate.
June 27, 1912. Morning 39.7°; Evening 38.8°.
A slight local swelling.
June 28, 1912. Morning 38.3°; Evening 38.8°.
June 29, 1912. Morning 38.4°; Evening 39.4°.
June 30, 1912. Morning 38.6°; Evening 38.4°.
The swelling disappeared.

This animal later suffered from acute pneumonia and died on July 22 before control-inoculation.

*No. 3.*—Black and white bull-calf weighing about 77 kilos.

August 19, 1912. Morning 39.0°; Evening—.
August 20, 1912. Morning 38.7°; Evening 39.0°.
1 p. m. injected subcutaneously into the right side of the thorax 10 c.c. of the filtrate.
August 21, 1912. Morning 38.5°; Evening 40.0°.
A goose's egg sized swelling at the point of injection.
August 22, 1912. Morning 38.9°; Evening 39.2°.
August 23, 1912. Morning 38.4°; Evening 39.7°.
August 24, 1912. Morning 39.3°; Evening 40.1°.
August 25, 1912. Morning 38.7°; Evening 38.7°.
The swelling disappeared.
September 18, 1912. Morning 38.4°; Evening 38.9°.
11 a. m. injected subcutaneously into the left side of the thorax 0.2 c.c. of a strong preserved virus.
September 19, 1912. Morning 38.1°; Evening 38.8°.
A fist-sized swelling at the point of injection.
September 20, 1912. Morning 38.6°; Evening 38.7°.
September 21, 1912. Morning 38.4°; Evening 38.6°.
The swelling disappeared.
October 2, 1912. Morning 39.1°; Evening 39.2°.
3 p. m. injected subcutaneously into the right side of the thorax 0.1 c.c. of a virulent liver-piece broth culture, 18 hours old.
October 3, 1912. Morning 39.4°; Evening 39.5°.
A hand-sized swelling at the point of injection, appetite somewhat poor.
October 4, 1912. Morning 38.8°; Evening 39.3°.
Appetite normal.
October 5, 1912. Morning 38.6°; Evening 39.1°.
Reduction of the swelling.
October 6, 1912. Morning 38.5°; Evening 38.7°.
October 7, 1912. Morning 38.9°; Evening 39.3°.
Increase in the swelling to the size of a hen's egg.
On October 11 the local swelling nearly disappeared.

*No. 4.*—Red cow. Weight, 318 kilos.

October 13, 1912. Morning 38.2°; Evening—.
October 14, 1912. Morning 38.2°; Evening 38.5°.
12 noon injected subcutaneously into the right side of the thorax 10 c.c. of the filtrate.

October 15, 1912. Morning 38.4°; Evening 38.6°.
A swelling as large as two hands at the point of injection.
October 16, 1912. Morning 38.3°; Evening 38.8°.
Enlargement of the swelling.
October 17, 1912. Morning 38.2°; Evening 38.2°.
Decrease in the swelling.
October 18, 1912. Morning 38.5°; Evening 38.5°.
The swelling nearly gone.
October 30, 1912. Morning 38.5°; Evening 38.5°.
12 noon injected subcutaneously into the left side of the thorax 0.2 c.c. of a strong preserved virus.
October 31, 1912. Morning 38.3°; Evening 38.6°.
A hand-sized swelling at the point of injection, appetite somewhat poor.
November 1, 1912. Morning 38.5°; Evening 38.6°.
Decrease in the swelling.
November 2, 1912. Morning 38.6°; Evening 38.5°.
November 3, 1912. Morning 38.1°; Evening 38.3°.
The swelling nearly gone.

In the summer of 1912 I had an opportunity to make a further inoculation experiment of the filtrate with nine cattle, the results proving satisfactory. Since that time this method of immunization of animals against blackleg alone has been practised in this country; the statistics are as follows:

| | 1913 | 1914 | 1915 | 1916 | 1917 |
|---|---|---|---|---|---|
| No. of cattle treated... | 1,226 | 1,514 | 2,041 | 1,119 | 1,145 |

In addition to the above the amounts of the filtrate used in Corea are: 1,000 c.c. in 1913, 2,000 c.c. in 1914, 33,000 c.c. in 1915, 46,000 c.c. in 1916, and 100,000 c.c. in 1917.

While visiting the United States of America, on the way home from Europe the year before last, I gave Dr. A. Eichhorn, then Chief of the Pathological Division, Bureau of Animal Industry, U. S. Department of Agriculture, in Washington, an outline of my method and mentioned the good results obtained through it during a few years in this country. In the June, 1917, number of JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, Dr. Eichhorn, now of Lederle Antitoxin Laboratories, published an article on "Blackleg Filtrate" in which the fact that my method of immunization against blackleg produced solid immunity and was totally unaccompanied by danger was well confirmed. In April last I was asked indirectly by Dr. Haslam, Purity Biological Laboratory, U. S. A., how to prepare the filtrate, so that some information relating to its preparation was made indirectly.

RÉSUMÉ. In conclusion I will here summarize the results of my investigations concerning immunization of animals against blackleg.

1. A virulent aërobic blackleg culture, rich in spores, can be readily obtained by using meat-piece or liver-piece broth as the culture medium and it can be preserved for a year or more with the addition of glycerine.

2. Efficacious blackleg vaccines can be made by heating the aërobic culture rich in spores, but uniform attenuation of the virus

is not always expected, so that the practical use of these vaccines should be abolished, owing to possible losses from injection.

3. A mixture of immune serum and virus in proper proportion confers an active immunity on animals treated. To determine its practical value, however, further experiments are necessary.

4. An injection of the germ-free filtrate of blackleg exudate also produces an active immunity in animals treated. To prepare the amount sufficient enough for its practical use it is very expensive, because it is necesary to use living calves in order to obtain blackleg exudate.

5. The filtrate of a pure culture of the blackleg organism confers a solid immunity on animals treated and it has been already successfully used in thousands of cattle in infected districts. It is inexpensive, the material for the preparation being aërobic cultures of the organism in meat-piece broth, and its injection is not accompanied by the least danger, because the filtrate is quite germ-free. The filtrate can be preserved for several months with the addition of toluol.

[Work done in the Institute for Infectious Animal Diseases, Nishigahara, the principal part of which was published, in 1914, in the Sixth Report of the Institute (Japanese).]

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# HEMORRHAGIC SEPTICEMIA AND ITS CONTROL IN PENNSYLVANIA*

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In presenting data gathered during our three years' experimental work with vaccine in the control of hemorrhagic septicemia, we intend to dwell but briefly upon the occurrence, etiology, anatomical changes, symptoms, etc., of the disease. For these details the reader is referred to some of the recent works in veterinary medicine regarding pathology and therapeutics or pathology and diagnosis. It is our purpose to show from statistics gathered in vaccinating over 2,000 animals on various farms throughout the state, why we feel that this method of control is valuable, and that sanitarians can only lend all possible aid when it is employed.

In 1895, in his annual report, Pearson mentioned sudden deaths of cattle due to some unknown cause, and concluded that while many were due to known diseases not recognized, others were no doubt due to diseases of which but little was known, or that certain poisons had operated to destroy the animals.

In 1896 his report cited the occurrence of an outbreak in Lancaster County in November. Twelve animals were found ill, eleven unable to stand; all had a low fever and a slightly accelerated

*Read at the Pennsylvania Medical Association, Harrisburg, Pa., Jan. 22nd, 1918.

pulse. The appetites were gone, and there were indications of abdominal pain, while weakness seemed to be more noticeable in the hind quarters than in the front. Some animals showed considerable excitement, and all but two were constipated. Necropsy on two that died revealed only slight changes in most of the parechymatous organs, but there were some changes of the digestive tract, also a yellowish serum around the kidneys, and congestion of the lungs. There was a history of their having been kept in a corn stalk field for five days prior to the time when it was noticed that they staggered in walking, rapidly lost strength, became unable to stand, and exhibited the other symptoms already mentioned.

In 1897 reference is made to an outbreak in Huntingdon County, following the purchase of seven yearlings in Center County, which, shortly after reaching their destination developed a severe cough, lost condition, and became emaciated, four of the animals dying. Subsequently some other cattle on this farm developed similar symptoms, leading to the belief that the infection was contagious. The owner, suspecting tuberculosis, had the animals tested with entirely negative results. A post-mortem examination on one of the heifers showed that the anterior lobes of the lungs were solidified, dark red in color, upon cross examination revealing numerous small cavities, containing a yellowish cheesy pus. The bronchial tubes contained frothy mucus, and the lining membrane was thickened. The connective tissue septa between the lobules were infiltrated with serum and thickened; pleura and lymphatic glands normal, and other organs normal in appearance, although somewhat pale.

In 1898 the same writer made quite a lengthy reference to "Corn Stalk Disease", which had occasioned enormous losses in some of the principal corn growing states of the West, and referred to the outbreak mentioned in the 1896 report as being of the same nature. This disease was not supposed to be contagious, although its cause had not been fully ascertained. On account of the length of this report, we cannot quote from it fully. Outbreaks were reported from several farms in different counties, and the symptoms and autopsy findings seemed to warrant a diagnosis of "Corn Stalk Disease".

In this 1898 record a part of the report on investigation of an outbreak in Franklin County in December 9, 1898, reads as follows: "All the animals that died recently had a history of having

been fed from a few days to several weeks on corn fodder. *However, a number of animals had died on farms south of St. Thomas during the months of October and November of a disease having somewhat similar symptoms, were at pasture when they died, and had not received any corn fodder.''* This report also mentioned that while under certain conditions of moldiness and fermentation, corn stalks and corn fodder become exceedingly poisonous to many cattle, it was noted that all cattle exposed in the same way did not become affected and that the symptoms varied.

In 1900 he reported a disease, prevailing in the spring and summer, among cattle in wild mountainous regions, that failed of identification during the year, but which destroyed several hundred cattle annually, and was so prevalent as to make large areas of land useless for pasturing purposes.

In 1902 investigations were conducted as to the etiology of the so-called ''Mountain Disease'' and as the result Pearson and Gilliland proved it to be identical with ''Rinderseuche'' of Germany, and with *hemorrhagic septicemia* that had been recognized among cattle in Minnesota and Wisconsin, stating that this discovery removed a cloud of doubt as to the cause of the loss of great numbers of cattle. In this same report, Pearson stated that ''hemorrhagic septicemia or spotted fever'' of cattle has also been known in Pennsylvania as ''Carbon County Disease'' or ''Mountain Disease of Cattle'', and that it was believed to have occurred during that year in the counties of Cameron, Carbon, Center, Clearfield, Franklin, Forrest, Huntingdon, Lackawanna, Lycoming, Perry, Potter, Somerset, Wayne, and Warren.

Following is a description of the symptoms and pathological changes noted by him: ''Fever, loss of appetite, dullness, diminution of milk flow, groaning, discharge of bloody mucus from the nose, staring coat, red mucous membranes, swelling about the throat; which is hot, rather tense and painful and is sometimes accompanied by harsh or difficult breathing. There is usually a little discharge of blood from the anus. Sometimes there is a little leakage of blood through the skin at various points as though the animal had been stung by large flies or pricked with needles. In other cases the disease seems to affect the intestinal tract chiefly and in this case there is a diffuse hemorrhagic gastro-enteritis, causing much depression, accumulation of gas, evidence of pain in the abdominal cavity and the feces are covered with blood, shreds of

fibrin or mucus. The course of the disease is usually short, varying from twelve hours to a week, and it terminates in death in nearly all cases.

On post mortem examination it is observed that the tissues beneath the skin in the region of the throat are infiltrated with serum and that scattered through this infiltrated area there are many points of hemorrhage; sometimes the hemorrhage is extensive, causing the entire infiltrated area to be of a red color. This swelling about the throat usually involves the walls of the pharynx and larynx. The root of the tongue is often swollen and infiltrated with yellow serum. Points of hemorrhage may be observed beneath the skin on any part of the body. Sometimes the lungs show evidence of hemorrhage into them and there is an accumulation of blood in the chest cavity. If the intestines are involved there is hemorrhage into large or small areas of the wall, causing it to be of dark red color and considerably thickened. The appearance of the blood is not materially altered; it coagulates in the usual way. The most characteristic alterations are the points of hemorrhage indicating an escape of blood from the vessels into the subcutaneous connective tissues, into the lining membranes of the abdominal and thoracic cavities and into the swollen areas about the throat and at the root of the tongue. Young or old cattle may be afflicted by this disease."

In the foregoing reference to the various named diseases, it is not claimed that those outbreaks of "Corn Stalk Disease" and catarrhal or broncho-pneumonia were what we now know as hemorrhagic septicemia, nor that they were due to an organism belonging to the hemorrhagic septicemia group. There are distinct pneumonias and certain distinct cases of forage poisoning, but from the fact that we do not have reports of these two diseases sent in from counties where they previously existed, and as we are and have been for several years receiving reports of hemorrhagic septicemia outbreaks in these same and additional counties, we are strongly inclined to the belief that many of the outbreaks previously reported under other names were in all probability due to organisms belonging to the hemorrhagic septicemia group. Investigations by Billings, Gamgee, Mayo, Moore, and others, tend to confirm this belief.

Hemorrhagic septicemia of cattle is usually an acute, less frequently a subacute, infectious disease, in the course of which the febrile symptoms are often accompanied by manifestations of an

acute gastro-enteritis, inflammatory edema of the skin, or frequently a necrotic-pneumonia associated with edema of the interalveolar connective tissue. The causative agent is *B. bovisepticus.*

Occurrence. The disease occurs practically everywhere, either sporadically or enzootically, especially during the late summer and fall months. *In Pennsylvania, by far the greatest number (90%) of the outbreaks during the past three years, have been reported in August, September, and October.* There is a mistaken idea held by some veterinarians that hemorrhagic septicemia does not occur in successive years on the same farm, but this has no foundation. We have repeatedly seen it recur in different herds. Since 1878, when described by Bollinger as occurring near Munich among deer and wild boars, it has been observed in cattle, sheep, hogs, and occasionally in horses and mules. Among the latter cases may be mentioned an outbreak in Lancaster County, Pa., August, 1916, in young mules, resulting in five deaths and the subsequent positive necropsy and bacteriological findings in the two cases seen. To date we have not diagnosed the disease in sheep in this state. The outbreaks are confined to the mountains or to those sections in which the land is wild, broken in contour, wooded, and covered with rank vegetation. Seldom has it occurred in the southeastern part of the state where the land is flat, rolling, and farmed extensively, except in steers (feeders) intended for fattening for the spring markets and introduced on farms in the fall after passage through various stockyards. Our records show that animals of all ages are affected, cases having been reported in calves, young heifers, and aged cows up to and including twelve years of age during the year 1917.

Symptoms. The period of incubation in natural infections is probably in the majority of cases from twelve to seventy-two hours, but this is variable, and, except in the chronic cases, may run from six hours to eight days. At first there is a rapid rise in the body temperature to over 40° C. (104° F.) accompanied by a quickened pulse, dullness, rough coat, and muscular tremblings. In some cases the surface of the body feels alternately hot and cold, while the muzzle is cold and dry. There is also cessation of the appetite, rumination and milk secretion. Peristalsis is often retarded; constipation at this stage may be noticed. Later there are symptoms of colic with much straining, when the animal passes, instead of the usual dry, dark brown feces, a mushy and finally a thin

fetid fluid which is frequently mixed with fibrin and mucus flakes, as well as with blood. Often blood exudes from the nose, and sometimes may be passed in the urine. Some animals show affections of the throat and are unable to swallow except with difficulty. Others show disinclination to move, exhibit stiffness, and in some instances actual lameness. Occasionally painfully edematous swellings are seen about the legs and shoulders as well as in the throat. Animals have been observed to drop to the ground and die in a short time, apparently without pain. Others live for several hours in great pain, as indicated by groans and muscular spasms. Animals sick for any length of time rapidly lose flesh. In the edematous (exanthemous) form the head and neck swell, especially in the region of the throat and develop, as a result of the rapidly increasing inflammatory edema of the subcutaneous connective tissue, causing a deformity of these parts. In such cases swelling of the legs or inflammatory enlargements of the different joints may be observed. The skin over the swollen parts of the body is very tense, warm, and sensitive. An acute conjunctivitis, and the yellowish colorization of this membrane, frequently develops with profuse lachrymation. The buccal mucous membrane is bright red, warm, dry, and swollen. Deglutition may be difficult or impossible, causing saliva to accumulate in the mouth and drivel from the corners in long tenacious strings. The tongue may swell to such an extent that it entirely fills the mouth cavity, or it even may protrude, appearing bluish red or dirty reddish brown in color.

Respiration is difficult and the animal breathes heavily. Some die of asphyxiation, or asthenia, which is caused by a marked enteritis. The "sweating of blood" mentioned by Pearson has been observed in a number of cases.

The pectoral form is characterized by an acute pleuro-pneumonia and the animal stands immovable with back arched, has a dry painful cough and a colorless or reddish foamy discharge from the nose. One or both sides of the thorax may show a dullness over different areas with bronchial breathing and vesicular rales, or there may be a total absence of respiratory sounds. Respiration is greatly accelerated and labored. Rumination ceases, peristalsis of the rumen and intestines is frequently suppressed. Constipation is followed by bloody diarrhea, after which the weakened animal rapidly succumbs. The pectoral and abdominal forms of the disease are the ones seen in Pennsylvania and we can recall no instance

of having observed the edematous (exanthemous) form reported by some writers.

ANATOMICAL CHANGES. *The characteristic lesions of the disease are widely distributed areas of hemorrhage varying in size from a pin-point to several centimeters in diameter, in color from light red to almost black and frequently accompanied with a serofibrinous exudate, usually yellow but occasionally dark red in color.* These serous hemorrhages, petechiae and ecchymoses, when extensive, give the entire abdominal or pectoral viscera the appearance of having been splashed with blood. All cases show some hemorrhagic areas in the subcutaneous connective tissue, the number and size of these varying in different individuals. Gas is not present in the subcutaneous connective tissue except as a post mortem change. The edematous cases show gelatinous infiltrations of the tissues. The abdominal and thoracic cavities may contain several liters of yellow or reddish colored serous fluid.

Acute hemorrhagic inflammations of the intestinal tract are frequent—with thin fluid contents, gray in color or blood-stained, and having a very fetid odor. The blood is usually of a normal color and clots readily. The surface of the lungs is often petechiated or even ecchymotic. Pneumonia of the lobular type is a very constant complication. On section this organ often presents areas of red and gray hepatization having the marbled appearance seen in contagious pleuro-pneumonia and when squeezed, exudes a yellow serum. The heart shows petechiae, ecchymoses or more extensive hemorrhages of the pericardium, epicardium or endocardium. The spleen is usually normal in appearance or at most may be swollen in localized areas presenting a few spleen tumors or petechiae. The liver in a small number of cases shows hemorrhagic infarcts, and is rich in blood. The kidneys are slightly if at all affected, and sometimes show a few petechiae macroscopically.

Reynolds reports an outbreak in which meningitis was invariably present. Wilson and Brimhall report an animal four months pregnant which showed small hemorrhages in the placental membranes.

DIAGNOSIS. Primarily this must depend upon the history and symptoms and can be verified by necropsy and bacteriological findings. Care should be taken not to mistake anthrax for hemorrhagic septicemia. A few of the most constant symptoms are repeated.

Animals show marked dullness and depression. They segre-

gate themselves, stand with arched back, the coat is lusterless and staring. The feces are blood-stained and in some instances appear as almost pure blood. Some show bloody nasal discharge, others petechiae of nasal mucous membranes and conjunctiva. Temperatures run very high and "sweating of blood" is frequently observed. Edemas, particularly of the throat, are fairly constant.

Hemorrhagic septicemia may be differentiated from blackleg and malignant edema by the absence of gas in the subcutaneous tissue—from anthrax by the fact that on autopsy the spleen is not swollen and the blood is normal in appearance and clots readily. In anthrax the spleen is almost without exception uniformly swollen, the blood is dark and tarry and does not coagulate.

Decomposition changes on a carcass dead for some time, alter the lesions, and render diagnosis more difficult; therefore it is essential that carcasses should be examined shortly after death.

The pectoral form may readily be mistaken for pleuro-pneumonia, therefore in calves and shipped animals care should be taken not to confuse it with this disease. The history should be of help in such cases.

Control. Because most investigators believe that hemorrhagic septicemia is a disease of the soil, and the fact that the organism dies rapidly under adverse conditions, traffic restrictions have not been rigid. Originally it was thought best to separate the sick from the well animals, removing them to other pastures, dividing them into small lots, and paying strict attention to the burning of carcasses, cleaning and disinfection of stables, etc. Hutyra and Marek state that in India they aim to control the disease with the aid of protective vaccination, but give no results. Holmes found the simultaneous vaccination with serum (which he produced through the subcutaneous inoculation of cattle and buffaloes) and with virulent cultures most effective, though it is claimed that such vaccination is not without danger for the animals. It is stated that the employment of cultures killed by heat, and also sterilized pleuritic exudate, has given good results. Baldrey employed a vaccine prepared with cultures sensitized to immune serum and subsequently killed at 60° C., reducing his losses from 100% among non-vaccinated cattle to 22% to 28% in the vaccinated animals.

In 1912 Mohler and Eichhorn reported on some work done in immunizing the buffalo herd in Yellowstone Park the previous year, and had no losses during the following twelve months. At

this time they demonstrated by means of the complement fixation test that vaccinated animals responded with the production of immune bodies, and reactions were noted even three months following the vaccinations.

Having experienced very unsatisfactory results with the isolation methods and internal medication recommended, we decided to do a small amount of experimental work with vaccines. The method employed in the production of this vaccine, and the reasons for its use in preference to other preparations have already been set forth in two publications.

During the year 1915, the laboratory of the State Livestock Sanitary Board prepared and sent out vaccine which was used on 434 animals in eight different herds. Three hundred and sixty-six (366) sick and healthy animals in six herds were vaccinated. As a result of outbreaks in these herds 42 deaths had occurred prior to vaccination and six were sick when vaccinated. Three of the sick and two apparently healthy animals in one herd died within one week. In other words in 1915 the disease was immediately checked in five of the infected herds, and there was not a single loss in any of the herds after one week from the date of vaccination. In addition to this we vaccinated 166 other animals, on pastures adjoining those showing infection, with not a single loss.

In 1916, following the satisfactory results of the 1915 work, vaccine was used on 366 animals in seventeen infected native herds. Fifty-three deaths had occurred prior to vaccination. Nineteen were sick when reported and were vaccinated along with the 347 remaining healthy animals. Ten of the sick and four apparently healthy animals died within one week and seven healthy after one week following the administration of the vaccine. These losses all occurred in six herds. In summarizing we find that during that year the disease was immediately checked in eleven of the seventeen herds, and that fifteen of the seventeen herds showed no losses one week after vaccination. In addition to these, eighty-eight animals on farms adjoining those having outbreaks were vaccinated prophylactically with no losses. The above figures for 1916 refer to outbreaks in native herds on pasture. Two hundred and fifty-eight (258) animals in herds exposed to the "Shipping Pneumonia" or so-called "Stockyard's Pneumonia" occurring in steers brought to the state as feeders were treated prophylactically and our records show a total of twenty-three sick steers distributed through eleven

herds with twenty-two recoveries, and but one death following the vaccination, while none of the vaccinated cattle developed the disease.

Continuing in 1917, we vaccinated 895 animals in 38 herds on farms where the records showed 109 deaths prior to the receipt of the reports and administration of the vaccine. At the time of vaccination 18 animals were sick. Nine of these and eleven apparently healthy animals died following the vaccination. Eleven of those twenty deaths, including the nine sick, occurred within one week. In twenty-five of the thirty-eight infected herds the disease was immediately checked without a single further loss and in thirty-four of the thirty-eight (38) herds not a single loss was reported after one week from the date of vaccination. In other words there were but nine deaths from a total of 895 animals after one week following the vaccination and these deaths include everything reported as being lost by the owner, between the time of vaccination and the rendering of the report which was received from six weeks to four months later. One hundred and sixty-three (163) animals, on which the vaccine was used as a prophylactic, showed not a single outbreak.

In summarizing our work of vaccination for the control of hemorrhagic septicemia during the three years 1915 to 1917 inclusive, we find a total of sixty-one infected herds, containing 1831 animals, showing 204 deaths, or 11.1% prior to vaccination. Fifteen hundred and eighty-four (1584) healthy animals and forty-six (46) sick animals received vaccine. Twenty-two of the sick animals or 51.1% died. Twenty-four apparently healthy animals among the 1584 vaccinated, or 1.5%, died following the vaccination, eight of these within one week. Approximately one per cent (1.0%) of losses only was recorded in treated stock and as previously mentioned this includes all deaths, some of which were no doubt not due to hemorrhagic septicemia. In forty-one of the total sixty-one herds, the disease was immediately checked without further losses, and in fifty-five of these sixty-one herds not a single loss was recorded after one week from the date of vaccination, during which time we have figured the animal should have developed some immunity. The mortality prior to vaccination, including the sick animals which died, has been 12.3%. The mortality following vaccination, including deaths within one week, has been 1.5%. The mortality following what we term the completion of the vaccination at the end of one week has been less than 1%.

Furthermore, there has been but one reported case of hemorrhagic septicemia in the twenty-three (23) vaccinated herds of 1915 and 1916. This herd was vaccinated in 1916, and showed a recurrence in August, 1917. Of the four unvaccinated control herds from 1915, two have shown the reappearance of the disease. Other strong evidence in favor of the vaccine may be added from the prophylactic vaccination of several hundred animals on pastures adjoining those having outbreaks, and on which not a single case of the disease was reported.

We have frequently heard the remark that even though not vaccinated the remaining animals in infected herds might have shown no further losses. This may have been true of a few herds but it is reasonable to presume that the disease would immediately stop in forty-one herds and not a single loss would be recorded in fifty-five out of sixty-one herds over a period of three years with merely a visit and diagnosis by the local veterinarian without the aid of some prophylactic.

The method employed in the production of the vaccine used in the foregoing work and the reasons for its use in preference to other preparations have already been set forth in two publications. The only standard which we have been able to fix upon is that the cultures must be virulent for rabbits and that five (5) c.cms. injected intravenously shall be innoxious for young cattle.

We have no knowledge as to the efficiency of bacterins or other preparations. as the results following the work done by us were obtained with the exclusive use of this living vaccine,

SUMMARY

| | Total herds | Total animals in herds | Deaths prior to vaccination | Sick prior to vaccination | Healthy vaccinated | Sick vaccinated | Deaths of sick following vaccination | Deaths of healthy following vac. | Death after 1 week from vaccination | Herds showing no deaths following vac. | Herds O. K. 1 week after vaccination |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1915 | 6 | 408 | 42 | 6 | 350 | 6 | 3 | 2 | 0 | 5 | 6 |
| 1916 | 17 | 419 | 53 | 19 | 347 | 19 | 10 | 11 | 7 | 11 | 15 |
| 1917 | 38 | 1004 | 109 | 18 | 877 | 18 | 9 | 11 | 9 | 25 | 34 |
| Total | 61 | 1831 | 204 | 43 | 1584 | 43 | 22 | 24 | 16 | 41 | 55 |
| Percentage | | | 11.1 | 2.3+ | | | 51— | 1.5+ | 1% | 67+ | 90+ |

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# NOTES ON THE ACANTHOCEPHALID AND ARTHROPOD PARASITES OF THE DOG IN NORTH AMERICA

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This paper is primarily intended to cover additional information regarding the rare thorny-headed worm of the dog, but in view of the fact that the writers are summarizing in other papers, published (Hall and Wigdor, 1918) and in manuscript, the available data as to the occurrence of protozoan, cestode, trematode and nematode parasites of the dog in North America, in connection with some new findings, a summary of our knowledge of arthropod parasites is included in this paper in order to complete a series covering the parasites of dogs in North America. These summaries are intended to be comprehensive, but not exhaustive. Not all records of a given parasite are cited and by no means all the literature possibly involved has been examined.

ACANTHOCEPHALA. *Echinorhynchus canis* was described from this country by Kaupp (1909) on 4 specimens collected from a dog at San Antonio, Texas. No subsequent writers have reported this species. Dr. Clifford C. Whitney collected one specimen of what is evidently this species from a young, black and white, male, mongrel dog at College Station, Texas, on March 8, 1917, and sent

it to one of us (Hall) at Detroit. It appears, therefore, that this rather rare parasite is established in Texas, at least.

Through the courtesy of Dr. Whitney, we were allowed to retain his specimen for study. A brief description is as follows:

The worm is a female, 14 mm. long. The proboscis is armed with 6 rows of hooks, the largest set anteriorly. The hooks in the 4 anterior rows have anterior and posterior roots resembling the handle and guard of the taenioid cestode hook; those in the 2 posterior rows are rosethorn-shaped (see figs). The proboscis shows 33 hooks, of which 18 are large and 15 small. It is likely that 3 of the small hooks have been lost and that the total number present should be 36. The proboscis is 2 mm. long. The mounted specimen shows that the body is distinctly annulated. The body form and out-

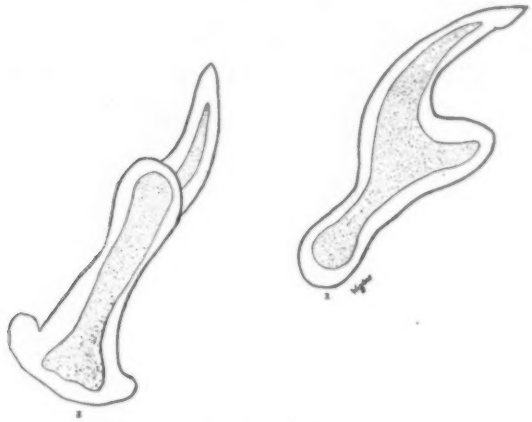

FIG. 1. *Gigantorhynchus canis*
Large hooks from first and second rows as numbered x180

line is substantially that figured by Kaupp (1909). There are eggs present, but apparently these have not been fertilized (this was the only specimen present in the host animal) and segmentation has not begun.

The cuticular annulation, the proboscis structure and the hooks indicate that this worm belongs in the family Gigantorhynchidae. As regards its generic position, it is difficult to ascertain this accurately by an examination of the one immature female specimen in our possession, but it appears to have the essential characters and appearance of the genus *Oncicola*, Travassos, 1916, and it is accordingly designated *Oncicola canis* (Kaupp, 1909) Hall and Wigdor, 1918.

In view of the fact that Acanthocephala forms have been reported from the dog in Europe, the question naturally comes up as to whether the European and American forms are identical. The European species is listed by Railliet (1893), Neveau-Lemaire (1912) and other recent writers as *Echinorhynchus grassii* Deffke, 1891. An examination of Deffke's (1891) paper, shows that he has in his list of dog parasites "*Echinorhynchus grassi*, 1888". This is evidently not an attempt to name an *Echinorhynchus* species after Grassi, as the date after Grassi's name shows, but is a reference to Grassi's paper of that date regarding this parasite. So far as we can ascertain, Grassi and Calandruccio (1888) listed an *Echinorhynchus* from the dog in Sicily; they state that Sicily is an exception to the rule that in general *Echinorhynchus* is rare in mammals other than swine, and that not infrequently they found

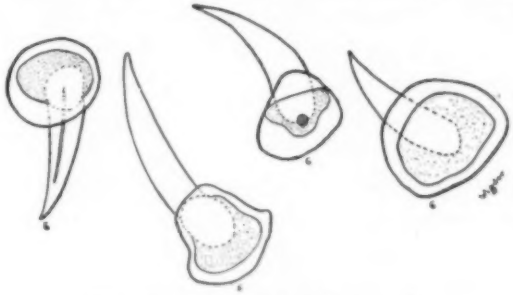

FIG. 2. *Gigantorhynchus canis*
Small hooks from fifth and sixth rows as numbered x240

an *Echinorhynchus*, probably a new species, in the small intestine of the dog. Travossos (1917) makes *Echinorhynchus grassii* a synonym of *Moniliformis moniliformis*, which eliminates the possibility that the European and American forms are identical. Granting the accuracy of the Brazilian authority's synonomy, it follows that the dog is parasitized at times by at least 2 echinorhynchs, *Moniliformis moniliformis* and *Oncicola canis*. The latter is probably a customary parasite of some Texan carnivore other than the dog. *O. canis* is very similar to *O. oncicola* (v. Ihering, 1892). Both species show asymmetrical hook bases in some hooks and recurved projections on hook tips, but the hook measurements are so dissimilar as to make it quite unlikely that the species are identical. Travassos gives measurements for 4 types of hooks in *O. oncicola*, the first type being the hooks of the first and second (or anterior) rows, the second type the hooks of the third row, the

third type the hooks of the fourth row, and the fourth type the hooks of the fifth and sixth (or posterior) rows. His measurements and ours are as follows:

| Species | Hook type | Distance, tip of blade to tip of apical root (microns) | Distance between root extremities (microns) |
|---|---|---|---|
| *O. oncicola* | First | 348 | 177 |
| *O. canis* | First | 200 | 148 to 160 |
| *O. oncicola* | Second | 268 | 149 |
| *O. canis* | Second | 140 | 50 |
| *O. oncicola* | Third | 227 | 130 |
| *O. canis* | Third | 166 | 116 |
| *O. oncicola* | Fourth | 120 | — |
| *O. canis* | Fourth | 130 | — |

In the measurements of hooks of the third type, we have measured from the tip of the asymmetrical process on the root, as Travassos appears to have done. Without this projection, the distance from the tip of the blade to the tip of the apical root is 130 $\mu$; that between the root extremities is 60 to 64 $\mu$. *O. oncicola* occurs in *Felis* (*Leopardus*) *onca* and *Felis* (*Catopuma*) *jaguarundi*, and it is quite likely that *O. canis* is normally parasitic in some of the Felidae.

ARTHROPODA. *Otobius megnini* (*Ornithodoros megnini*) has been reported from dogs in the southern United States by Hooker, Bishopp and Wood (1912).

*Ixodes ricinus* is reported from dogs in Canada by Hewitt (1915).

*Ixodes scapularis* is reported from dogs in the southern United States by Hooker, Bishopp and Wood (1912).

*Ixodes cookei* is reported from dogs in Canada by Hewitt (1915) and in the United States by Banks (1908).

*Ixodes kingi* is reported from dogs in the western United States by Hooker, Bishopp and Wood (1912).

*Ixodes pratti* is reported from the dog in Canada by Hadwen according to Hewitt (1915).

*Rhipicephalus sanguineus*, the brown dog tick, has been collected from the dog in Texas and in Mexico, according to Hooker, Bishopp and Wood (1912). Specimens of this tick from a dog on one of our battleships have been sent to this laboratory for identification, with the statement that the dog apparently became infested in New Orleans.

*Margaropus annulatus*, the cattle tick, has been reported from dogs in the southern United States by Hooker, Bishopp and Wood

(1912) and other writers, but it is very rare on this host.

*Amblyomma maculatum* has been reported from dogs in Texas and Louisiana by Hooker, Bishopp and Wood (1912).

*Amblyomma americanum* has been reported from dogs in Texas by Hooker, Bishopp and Wood (1912).

*Amblyomma cajennense* has been reported from the dog at Panama by Hooker, Bishopp and Wood (1912).

*Dermacentor andersoni* (*D. venustus*) has been reported from dogs in the western United States by Hooker, Bishopp and Wood (1912), by Stiles (1910) and by others.

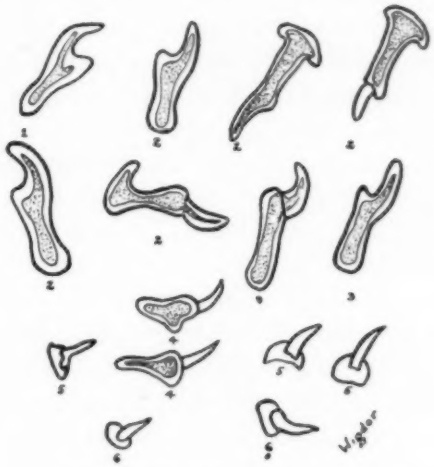

FIG. 3. *Gigantorhynchus canis*
Hooks from different rows as numbered x75

*Dermacentor occidentalis* is reported from the dog in the Pacific coast region of the United States by Hooker, Bishopp and Wood (1912).

*Dermacentor variabilis* is a common and widely distributed parasite in the United States, the dog being the usual host, and has been reported from the dog in Canada by Hadwen (1912).

*Sarcoptes scabiei canis* is the cause of sarcoptic mange in the dog. It appears to be much less common in the United States than demodectic mange.

*Demodex folliculorum canis,* the cause of demodectic mange in dogs, is common in the United States. We have had a number of cases here at Detroit.

*Linognathus piliferus,* the sucking louse of the dog, appears

to be more common on the west coast of the United States than in the East. We have found a few cases here at Detroit.

*Trichodectes latus*, the biting louse of the dog, is fairly common in the United States. In connection with tests of the efficacy of sodium fluoride against biting lice, proposed by Bishopp and Wood (1917) for use against biting lice of poultry and reported by Hall (1917) as effective against biting lice of the horse, we have made some tests in this laboratory of its efficacy against the biting louse of the dog and find it effective. We have seen no bad results from it, but the possibility of trouble from poisons ingested through licking the hair and skin must be kept in mind in treating dogs. In a test to determine the toxicity of sodium fluoride, we gave a 9-kilo dog 1 gram of sodium fluoride in a gelatine capsule, followed by a small amount of water. The dog seemed in fairly good health for 3 days, but was found dead on the fourth day; there was a severe gastro-enteritis, with some hemorrhage, and an acute nephritis.

*Ctenocephalus canis*, the dog flea, is common on dogs in the United States.

*Pulex irritans*, the human flea, is not an uncommon parasite of dogs, especially on the west coast of the United States.

*Echidnophaga gallinacea*, the stick-tight flea, is often found on the ears of dogs in the southern and southwestern part of the United States, according to Bishopp (1915).

*Gastrophilus intestinalis* (*G. equi*), *G. nasalis* and *G. hemorhoidalis* have been reported from the dog in experimental infestations in the United States by Hall (1917). *G. intestinalis* functions readily as an incidental parasite of the dog; *G. nasalis* did not adapt itself to the dog so readily; *G. hemorrhoidalis* apparently had little or no capacity for parasitism in the digestive tract of the dog.

*Cochliomyia macellaria* (*Chrysomyia macellaria*), the screw-worm, is a common parasite of domesticated animals in the southern United States. Dunn (1918) has recently recorded a case of infestation in the dog at Ancon, Panama.

*Cuterebra emasculator*, the rabbit bot, has been collected from the scrotum of the dog, apparently in North America, according to Gedoelst (1911).

*Dermatobia cyaniventris* (*D. hominis*) is reported as para-

sitic in dogs in tropical America by Verrill, according to Osborn (1896), and others.

*Myiasis*, due to infestation with various dipterous larvae, is not uncommon among dogs in the United States. We have several times seen cases of rectal myiasis in the dog, especially dogs that were sick and weak, and more particularly those that had diarrhea or blood in the feces. Fish (1910) records an interesting case of cutaneous myiasis, where a collie pup was found to have hundreds of maggots in the dense hairs along the spine from the neck to the scrotum, many of the maggots being imbedded in the skin. The species of fly responsible for these infestations is commonly not ascertained.

*Simulium molestum* is reported by Packard, according to Osborn (1896), as attacking the Newfoundland dogs of Labrador and driving them to take to the river for protection.

*Simulium pecuarum* is recorded in reports of the U. S. Department of Agriculture, according to Osborn (1896), as attacking dogs in the United States.

*Stomoxys calcitrans* is reported by Hewitt (1917) as attacking dogs in Canada.

*Tabanus lineola* and *T.trijunctus* are reported by Snyder (1917) as annoying dogs in southern Florida.

There are numerous other biting flies that attack dogs on occasions, but the records are frequently indefinite and uncertain.

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—The New York State Veterinary Medical Society will hold its annual meeting at Ithaca, N. Y., July 24, 25 and 26.

—The Oklahoma State Veterinary Medical Association has changed its time of meeting from July 10th and 11th to July 31st and August 1st.

—The South Carolina Association of Veterinarians will hold its ninth annual meeting at Columbia, S. C., September 4th and 5th.

—The Virginia State Veterinary Medical Association will hold its next meeting at Ocean View, Va., July 11 and 12.

# AN ANALYSIS OF TUBERCULIN TESTS AND POST MORTEM RESULTS—ACCESSORIES TO THE TUBERCULIN TEST

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Progress in medicine, and in any branch of science, is based upon a careful study and observation and modification of past experiences, practices and methods, and the *application* of new ideas that are perpetually evolved from new and old facts, discoveries and theories.

With this in mind, much good ought to come from a review of the use and results of tuberculin tests from the very beginning.

The U. S. Bureau of Animal Industry at one time reported the records of 23,869 positive reactors out of which 23,585 or 98.81% showed "lesions" on post mortem.

Unfortunately post mortem records do not exist to show the extent, degree and distribution of the lesions, so they can be grouped on a basis of the post mortem lesions, nor is this information available in the larger number of tests by practitioners and others not included in the Bureau figures. The "alpha" and the "omega" lesions are the same.

In some recent extensive and intensive research reading, I ran across Bulletin 102 of the University of Illinois, published in 1913, and showing in detail the results of the tuberculin test of the college herd, and the lesions and disposition of the slaughtered on post mortem. This herd, therefore, may well be taken as a type. Veterinarians might advantageously at this point try to recall and gather together into one composite herd every animal and herd they may recall testing and posting.

Let us consider all the *facts* now known and discovered that have a bearing and might be *applied* today for the improvement of the past. Of these the most important are that healthy cattle and closed tuberculin-reacting cattle *do not* give off tubercle bacilli, but that both reacting and non-reacting *open* tuberculous cows cough up, swallow and pass out tubercle germs in their feces, in numbers proportionate to how open and dangerous each case is; and the additional fact is that hogs will eat the feces and become proportionately tuberculous. Therefore, the hog *test*, and on post mortem will positively show the degree in the cattle.

Let us carefully view and study Table I of the University of Illinois in the light of present knowledge, and ascertain if it might not be possible to modify and improve the same with more science, less cost, and more conservation, by assuming to interject between the conclusion of the tuberculin test and the *ruthless slaughter* as an accessory and adjunct to the tuberculin, the pig recheck test.

TUBERCULOSIS IN THE ILLINOIS UNIVERSITY DAIRY HERD. BULLETIN NO. 162.

TABLE I—RESULTS OF SLAUGHTER

| Herd No. | Test | Post mortem | Herd No. | Test | Post mortem | Herd No. | Test | Post mortem |
|---|---|---|---|---|---|---|---|---|
| 1 | + | ± | 71 | ++ | ± | Lad | —? | ± |
| 10 | ++ | ± | 72 | ++ | ± | 90 | No test | ± |
| 12 | + | ± | 76 | + | ± | 85 | — | ±C |
| 16 | ++ | ± | 77 | + | ± | 34 | — | ±C |
| 19 | + | ± | 80 | + | ± | 13 | + | ? |
| 20 | + | ± | 83 | + | ±C | 21 | + | ? |
| 27 | + | ± | 84 | + | ± | 29 | +? | ? |
| 28 | + | ± | 86 | + | ± | 23 | + | ? |
| 30 | + | ± | 87 | + | ± | 17 | + | 0 |
| 31 | ++ | ± | 88 | + | ± | 33 | ?++ | 0 |
| 36 | ++ | ± | 92 | + | ± | 61 | ?+ | 0 |
| 37 | ++ | ± | 95 | + | ± | 67 | ++ | 0 |
| 39 | ++ | ± | 97 | + | ± | 69 | +— | 0 |
| 41 | ++ | ± | 129 | + | ± | 79 | + | 0 |
| 42 | +— | ± | 1002 | + | ± | Heifer | +— | 0 |
| 44 | + | ± | 1004 | + | ± | Heifer | + | 0 |
| 45 | ++ | ± | 1005 | ++ | ± | Joe | + | 0 |
| 46 | + | ± | 1007 | + | ± | 65 | + | Not s'l't'd |
| 47 | ++? | ± | 1008 | + | ± | 14 | No test | 0 |
| 49 | ++ | ± | 1017 | + | ± | 68 | ——— | 0 |
| 51 | +++ | ±C | Bull | + | ± | 104 | — | 0 |
| 52 | + | ±C | Grade | + | ± | 106 | — | 0 |
| 53 | + | ± | Heifer | + | ± | 109 | — | 0 |
| 54 | ++ | ± | Heifer | + | ± | Heifer | — | 0 |
| 56 | ++ | ± | Grade | + | ± | 1027 | — | 0 |
| 57 | ++ | ±C | Heifer | + | ± | 120 | — | 0 |
| 58 | +++ | ±C | Heifer | + | ± | 100 | — | 0 |
| 59 | ++ | ± | Heifer | + | ± | 106 | — | 0 |
| 60 | ++ | ± | Heifer | + | ± | 122 | + | 0 |
| 64 | ++ | ± | 15 | —? | ± | 124 | + | 0 |
| 66 | ++ | ±C | | | | | | |

+ =a reaction; —=test without reaction; ±=disease found; ?=questionable; 0=nothing found; C=carcass condemned.

There were 91 cattle in the Illinois herd. All but two (Nos. 14 and 19) were tuberculin tested. 90 of the cattle were slaughtered and one not. 76 of the tested cattle reacted to the tuberculin test. 19 of the reactors alone were worth over $3000. The whole herd of 76 must have thus been worth not far from $10,000. Such

an amount demands and requires the very best caution, judgment and conservatism consistent with sanitary safety possible, as to their final disposition. Error or fault in this regard might financially ruin a single individual owner.

It will be noted that out of the 76 reactors, eleven showed no lesions at all on post mortem. Four others had lesions so slight as to be doubtful. Of the 61 reactors showing lesions, *only* six were bad enough to condemn, and these, no doubt, represented the *open* reactors. This leaves a total of 55 so slightly affected that they were not even condemned after slaughter, and no doubt were the closed cases. A little later effort will be made to show a possible way to have found out the condition of the six *before* slaughter, instead of only *after* slaughter, and similarly for the 55 which need not have been slaughtered.

But more serious than the above is the fact that of the 13 which did *not* react, four or 32% showed lesions. Of these, two (Cows 34 and 85), were so *badly* diseased they were condemned. One of these two was the *worst* case the writer of the bulletin had ever seen. Therefore the *worst* one was left back in the healthy herd unconsciously. Of the eight animals condemned, two or 25% of the eight did *not* react, nor did they show physical signs of the disease. This is unfortunate, because it *defeats* the very object and high ideal of the test—and in addition created a false confidence. How many multiples and variations of this have occurred in the common herds of the country and state, where trained experts were not constantly with the herd? A little later, effort will be made to show a possible way the existence of such *unsuspected* non-reacting open spreaders might be ascertained, and regain confidence.

At this point it may be well to quote in fine type three paragraphs from the bulletin referring to Cows 34, 85 and 68. Study and analyze these carefully, accepting the *facts*, but exercising caution and care in accepting or making conclusions and "deductions". Science is classified knowledge, and consists of known facts that may be fewer, but always sound. "Deductions" from facts are many, and sometimes wrong, and therefore dangerous and in many instances thus more important than facts. Imagine the effects of the following on the farmer. Does the bulletin tend to encourage or discourage the use of the tuberculin test, when no qualifying hope is offered? Is there any to offer? There is.

"*Cow 34 failed* to react when tested in May, 1906. At that time she was not milking and failed to breed; hence she was in excellent condition. About a year later she began to go down in flesh, and would have died in July had she not been killed.

"When examined she proved to be the *worst* case the writer (of bulletin) had ever seen; the abdominal cavity was one mass of tubercles, and other parts of the body were badly diseased.

"It is probable that she was too far advanced and her system was already too full of the poison at the time tested to react. However, it was entirely possible for her to have become infected after the test. (Rogers cannot agree with such a deduction, and if so, the *only* cow that possibly could have infected Cow 34 was Cow 85 described below.) The writer (of the bulletin) believes that this cow was responsible for spreading much of the infection revealed by the test made in May, 1908. A large percentage of the two-year-old heifers which were with her in the pasture reacted. (Rogers feels Cow 34 *could* be responsible for *every one* of the 70 uncondemned reactors, together with the condemned ones [7]; it would be interesting to know if they were bought out of the same original herd.)

"*Cow 85* passed through *three* tests *without* reacting. She was a small cow and a heavy milker and feeder. Up to the time slaughtered, she was in very good flesh and physical condition. The only thing which would indicate the disease was a *cough*. She failed to breed readily and was sold for *beef* subject to inspection. *She was found to be very badly diseased.*

"In general, cows in which the disease is too far advanced to react to tuberculin, show external symptoms, but the writer (of bulletin) does not believe that *even an experienced veterinarian would have detected the disease* in Cows 34 or 85 by a physical examination. These two cases emphasize the fact that mature animals in a herd which is badly infected should be looked upon with much suspicion, even if they do not react. (Rogers thinks the original herd source of the bad or light animals should help determine this.)

"*Cow 68* passed several tests successfully, but had a *cough* for two or three years. Since she was one of the animals in the badly infected herd, it was *thought* that possibly she might have the disease in the *advanced* stage. She was *not* in as good condition *as Cow 85*. She was *slaughtered* but proved to be *free* from disease, the *cough* being due to some *other* cause."

Would the unqualified facts and lack of hope of the above tend to encourage or *discourage* tuberculin testing? Would not confirmed experiments and facts concerning the "pig-recheck" overcome this? Further on in the bulletin it is stated that the *only* means and method we have of detecting, reducing and checking the disease is with *tuberculin*. Is this wholly true to justify its admitted errors?

All of us have sometimes heard veterinarians in groups or in meetings say in substance and in variation: "I tested a herd of 75 cattle and (in hysterical tone) *twenty-five reacted*—and 24 showed *lesions*" (more hysteria). Let us have intelligence and hysteria in the right places, but the teachers and leaders are largely responsible, some and most of them unconsciously. Many veterinarians have conscientiously tested a herd, based on the advice and articles of teachers and authorities, and advised the owner to dispose of the reactors, and to thoroughly disinfect the premises, and assured the owner he "would be all right thereafter". But has time proved the carrying out of this advice true? Would such advice have proved true in the Illinois herd? No! Can we modify it? Let us see.

First, let us recognize not only the *value*, but also the *limitations* of *tuberculin*, and seek and supply accessories and adjuncts to its limitations. Let us assume we were to re-handle the Illinois herd.

In the Illinois herd, for example, after the tuberculin test, is to *clean* and disinfect the quarters in which both the reacting and the non-reacting herds are to be placed. *Cleaning* is as essential as efforts at disinfection, for in conjunction with direct and diffuse sunlight, the former will accomplish the latter.

The next thing to do is to put a regular unseparated herd or bunch of pigs behind the non-reacting herd unit. About one pig per each cow should be sufficient, but no separate pens for the pigs or the cows are necessary at first, if at all. This is to be done to find out if there are, or are not, one or more *open* unsuspected spreader cases like Cows 34 and 85 left back in the non-reacting herd. If on regular slaughter *all* the pigs are *free* of tuberculosis, it is positively a clean herd, and probably will always remain so. However, this could be annually easily confirmed by allowing hogs to associate with the cattle as in ordinary farm practice until the generation of animals in the original tuberculous herd were disposed of, and tagging and tracing to slaughter.

However, if tuberculosis *is* found in the hogs following the non-reactors, as would have been the case in the Illinois herd, it means there is "dynamite" (Cows 34 and 85) left back in the herd.

If the herd is worth it, the individual *cow* or *cows* (like 34 and 85) *must* be found out by individual pig tests in isolated pens, in the same manner as will be described in the reacting herd below.

The 76 *reacting* herd of cattle should be handled in the following way: all animals which are not and never will be worth much more than beef value, should be sent for immediate slaughter for obvious reasons.

A physical examination of the remainder should be made, and, if possible, the cattle should be arranged in stalls in an order of their apparent degree. This arrangement might be made within a week, by collecting samples of tracheal, esophageal, mammary and rectal secretions and feces, and making microscopical and cultural bacteriological tests, but this is not necessary.

Have the 76 reacting cattle come to the same stalls at night. Provide 76 separate shovels or pails or other conveyors for the manure of each cow, so that possible contamination will not interfere with the test.

Build one large temporary pen, divided into 76 compartments, each large enough for one pig or two. Gates are not needed. If possible have each of these pig compartments directly behind the stall of each cow.

The pen can be wholly or partially inside or outside the barn, and if convenient, boards can be temporarily removed or holes cut for manure to be thrown out for each cow to each pig. Or by wheelbarrows, pailfuls of manure can be hauled through an alley to the pens.

Two months should be a sufficient length of time to conduct the feeding test, but of course the longer, the better.

The question of expense might come up here. One man should be able to do this alone and have some spare time for other duties. It is a question of $100 versus $10,000 tied up in a reacting herd and it is worth it.

Hogs for a two-month period after weaning, and then tagged and put together for the possible development of the disease until regular slaughter, would be one way. Or take hogs within two months of market weight or age should be satisfactory.

Mix most of the grain foods for the hogs with the night manure

of the cattle. A little potassium iodide might increase the number of tubercle bacilli excreted as occurs in the human. Only the night and early morning manure need be fed, thus leaving the cattle out during the day.

About once a week, wash the mangers with clean water and feed the washwater to the corresponding pig. A little first milk from the same cow might be added.

At the end of 30 days tuberculin-test the pigs. Regroup the cattle of the corresponding reactor pigs.

Tag each hog by name and record number, and market the 76 hogs separately or with enough others to make a car-load. Ship to nearest market, other things being equal. Request that the load be slaughtered and inspected separately.

Get records of hogs having lesions in any degree, and not more than ten of the 76 hogs should show lesions. Get full reports upon the degree and extent of lesions of these ten tuberculous hogs.

If the whole 76 would have been allowed to follow the 76 cattle, the ten cattle would have infected *all* of the 76 hogs in some degree.

Back at the farm immediately separate the cattle that caused the tuberculous hogs from the others.

Determine the value of each and use judgment as to which of these it might pay to slaughter or which to keep under the Bang system.

This would leave three herds—1st, the non-reactor; 2nd, the open reactors; 3rd, the closed reactors, which I feel could be safely put with the non-reacting herd, but possibly not wise.

Such a plan would have discovered *Cows 51, 52, 57, 58, 66* and *83*, and also *Cows 34* and *85*, and possibly one or two others. These would be the only ones slaughtered. The other 81 or 83 cattle of the herd would be saved, or 66 of the 76 reactors be saved.

The "assumption" that all the reactors would get worse is entirely theoretical.

Cattle, out in the open, that will not produce tuberculosis in susceptible pigs within two months' intensive exposure, are not likely to become seriously tuberculous within a year at least.

This could be automatically checked and overcome by simply allowing succeeding crops of herds of hogs to naturally associate with the cattle, and if any of the hogs are found appreciably tuberculous, or as soon as they do, reconduct the intensive two-month individual hog test.

I do not feel that cattle with closed tuberculosis so often become progressively worse from the development and re-infection from their own lesions, as they do by being constantly re-infected day after day from *open* cases like Cow 34, and in the same way the first lesion was implanted. When *cows* like 34 are removed, the *cause* is removed. Owing to their outdoor life, most cows will be able to take care of and arrest further development of their own lesions, unless they are to a stage where they will infect hogs, and thus auto-infect themselves. The cow, with her "tracheal cud", is the queen of all auto-infectors, and I believe this explains why she is so often so extensively and badly infected. The beauty of the hog is, that it not only gets the spreader, but the auto-infector also.

*Cow 34*, and possibly also one or more of the seven other condemned or open cases, *infected* those with light lesions *before* the test. *After* the test, *Cows 34* and *85* infected the other that *reacted after* the first test, and showed only light lesions.

A herd that will not infect associating hogs has no open spreaders or auto-infectors in it.

A herd that will infect associating hogs, has one or more *open* spreaders and auto-infectors in it.

To find the open spreader and auto-infector as early as possible, and as fast as they may develop, is the *duty* and the *only* duty of the veterinarian.

Hysteria toward *all* reactors should be toned down, and the hysteria concentrated on the *open* cases.

Some of this can be reduced to an almost mathematical basis. This depends on the numbers of cattle; the numbers of germs passed per herd of cattle; the number of hogs sharing the germs; and the number of days or length of time exposed or sharing the germs, and innumerable combinations of these.

Ten cattle passing 30 lbs. feces each will pass 300 lbs. feces daily. Ten hogs will probably eat 30 lbs. moist feces daily each or a total of 300 lbs. 50 hogs would average 6 lbs. each, or in every case a fraction of the total feces available and eaten. One or five hogs would eat their share of the total eaten.

One cow passing one million tuberculous germs daily would give each of 10 unselfish hogs an average of 1/10th, or 100,000 germs. 5 hogs would get 200,000 each, and 50 hogs 20,000 and 100 hogs only 10,000 each.

Thus a large herd of hogs lightly infected might, in fact, point to a bad herd with one or more *bad* cases.

The unit degree of dangerousness in a herd, is equal to the average total number of virulent tubercle bacilli passed by the herd.

They may all be passed by *one* cow, or several cows may pass their proportion to make the same total.

That is, one cow only, in a herd of any size, may pass 1,000,000 tubercle bacilli daily.

In another herd of 100 cows, 10 cows may pass a daily average of only 100,000 each, yet the ten equal 1,000,000 germs, or an average of 10,000 per each 100 cows.

A herd of 100 hogs may be exposed *accidentally* or otherwise for *one* day only, to a herd daily passing 100,000,000,000 germs, and be lightly affected. In another case, one hog following for 200 days a cow passing only 1000 germs daily, would give the hog a total of 200,000 germs or twice as many, and show twice as severe lesions. This might apparently point to a herd of cattle twice as badly infected, which, in fact, would be only 1/1000th as bad.

That is why the author is always interested in, and has always shown the *total* number of hogs infected with lesions no matter in what degree. The dilution and length of exposure is unknown, in any case to the packing house inspector.

It seems plausible, in view of these apparent *facts*, that after a series of sufficient experiments of hog-association tests, almost absolute ante mortem accuracy can be predicted as to the condition of the cattle.

With the greatly increased value of cattle, some selling as high as $31,000.00, it behooves the veterinarian to give the matter serious thought so as to render the client and the country the maximum of service, with corresponding increased self-remuneration.

(AN AFTER-THOUGHT.) The hog will separate the acid-fast and hay bacilli from the tubercle formers—and the virulent from the non-virulent—and make a quantitative test also.

It is hoped all these facts will be carefully studied and weighed, as an accessory and adjunct to the tuberculin test, and that it will be used in connection with the accredited herd system, and thus assist in making it a real and lasting success, minus such mistakes as over-enthusiasm and over-confidence in tuberculin caused.

This should lead the way to putting tuberculosis location,

control and eradication, on a true scientific, conservative, intelligent basis.

And after 1918, it is hoped no more will valuable reacting herds be handled as inefficiently and wastefully as was the Illinois University herd and thousands of other herds, because of the pardonable limited and unapplied knowledge of that time.

SUPPLEMENT

| Pounds Feces Passed | | | | Number Tubercle Bacilli Open Cows Pass | | | |
|---|---|---|---|---|---|---|---|
| No. Cows | Daily | 30 Days | 100 Days | Daily | 30 Days | 100 Days | 200 Days |
| 1 | 30 | 900 | 3,000 | 1,000 | 30,000 | 100,000 | 200,000 |
| 1 | 30 | 900 | 3,000 | 1,000,000 | 30,000,000 | 100,000,000 | 200,000,000 |
| 5 | 150 | 4,500 | 15,000 | 5,000,000 | 150,000,000 | 500,000,000 | 1,000,000,000 |
| 10 | 300 | 9,000 | 30,000 | 10,000,000 | 300,000,000 | 1,000,000,000 | 2,000,000,000 |
| 50 | 1,500 | 45,000 | 150,000 | 50,000,000 | 1,500,000,000 | 5,000,000,000 | 10,000,000,000 |
| 100 | 3,000 | 90,000 | 300,000 | 100,000,000 | 3,000,000,000 | 10,000,000,000 | 20,000,000,000 |

| | | Share of Number of Tubercle Bacilli per Hog | | | |
|---|---|---|---|---|---|
| Number Germs Daily | No. Hogs | One Day | 30 Days | 100 Days | 200 Days |
| 1,000 | 1 | 1,000 | 30,000 | 100,000 | 200,000 |
| | 5 | 200 | 6,000 | 20,000 | 40,000 |
| | 10 | 100 | 3,000 | 10,000 | 20,000 |
| | 50 | 20 | 600 | 2,000 | 4,000 |
| | 100 | 10 | 300 | 1,000 | 2,000 |
| 1,000,000 | 1 | 1,000,000 | 30,000,000 | 100,000,000 | 200,000,000 |
| | 5 | 200,000 | 6,000,000 | 20,000,000 | 40,000,000 |
| | 10 | 100,000 | 3,000,000 | 10,000,000 | 20,000,000 |
| | 50 | 20,000 | 600,000 | 2,000,000 | 4,000,000 |
| | 100 | 10,000 | 300,000 | 1,000,000 | 2,000,000 |
| 5,000,000 | 1 | 5,000,000 | 150,000,000 | 500,000,000 | 1,000,000,000 |
| | 5 | 1,000,000 | 30,000,000 | 100,000,000 | 200,000,000 |
| | 10 | 500,000 | 15,000,000 | 50,000,000 | 100,000,000 |
| | 50 | 100,000 | 3,000,000 | 10,000,000 | 20,000,000 |
| | 100 | 50,000 | 1,500,000 | 5,000,000 | 10,000,000 |
| 10,000,000 | 1 | 10,000,000 | 300,000,000 | 1,000,000,000 | 2,000,000,000 |
| | 5 | 2,000,000 | 60,000,000 | 200,000,000 | 400,000,000 |
| | 10 | 1,000,000 | 30,000,000 | 100,000,000 | 200,000,000 |
| | 50 | 200,000 | 6,000,000 | 20,000,000 | 40,000,000 |
| | 100 | 100,000 | 3,000,000 | 10,000,000 | 20,000,000 |
| 50,000,000 | 1 | 50,000,000 | 1,500,000,000 | 5,000,000,000 | 10,000,000,000 |
| | 5 | 10,000,000 | 300,000,000 | 1,000,000,000 | 5,000,000,000 |
| | 10 | 5,000,000 | 150,000,000 | 500,000,000 | 1,000,000,000 |
| | 50 | 1,000,000 | 30,000,000 | 100,000,000 | 200,000,000 |
| | 100 | 500,000 | 15,000,000 | 50,000,000 | 100,000,000 |
| 100,000,000 | 1 | 100,000,000 | 3,000,000,000 | 10,000,000,000 | 20,000,000,000 |
| | 5 | 20,000,000 | 600,000,000 | 2,000,000,000 | 4,000,000,000 |
| | 10 | 10,000,000 | 300,000,000 | 1,000,000,000 | 2,000,000,000 |
| | 50 | 2,000,000 | 60,000,000 | 200,000,000 | 400,000,000 |
| | 100 | 1,000,000 | 30,000,000 | 100,000,000 | 200,000,000 |

# AN INFECTIOUS DISEASE OF GUINEA PIGS

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Introduction. On July 12th, 1917, five guinea pigs were sent to this laboratory for the diagnosis of the disease which was causing a daily loss in a breeder's flock of 200 pigs. This loss amounted to two or three a day which continued until August 8th, after sanitary measures were instituted. Upon autopsy of the guinea pigs, lesions very similar to those of tuberculosis were observed, consisting of pearl-like nodules in the lungs, liver and spleen. They were not as prominent and numerous in the lungs as they were in the other affected organs. Some of the cervical lymph glands were caseous and encapsulated. On section through one of these nodules, it was found to contain yellowish, semi-dry caseated pus. No calcification was present. Smear preparations from this pus stained after the Ziehl-Neelsen method did not reveal the presence of *Bact. tuberculosis* or other acid fast bacteria.

Dr. Pickens isolated an organism from the lesions which appeared to be the cause of the disease. The present paper purports to give the observations made on a series of inoculation and feeding experiments conducted on twenty guinea pigs. A description of the morphological and biological characters of the organism is also given.

Proposed Name. As far as the writer has been able to refer to bacteriological literature, the organism herein described is not identical with any of the heretofore known organisms. It is therefore considered as a new species and the name *Bacterium pickensi*, is therefore proposed.

The writer's attention was attracted to the descriptions given by different investigators on the Preisz organism causing caseous-lymphadenitis in sheep. In many respects their descriptions of this organism appears to be similar to that observed in *Bact. pickensi*. It was found, however, that *Bact. pickensi* is distinctly Gram negative and that in bouillon medium it presents a slight turbidity and a distinct ring formation, while with the Preisz organism these characteristics were not present. A strain of the Preisz or-

ganism was obtained from the American Museum of Natural History and when grown in the different media, its biological reactions coincided with the usual description given for it in textbooks and articles. Repeated tests on *Bact. pickensi* after the Gram's method using a 24 hours' growth invariably showed that it did not retain the stain. Smear preparations were made on the same slide with both organisms and were stained simultaneously following closely the directions given in the text. (Moore and Fitch's Bact. Diag.)

The descriptions of the gross appearance of lesions produced by the Preisz organism as described by different writers in guinea pigs appeared also to be strikingly similar to those produced by *Bact. pickensi.*

Morphology and Staining. *Bacterium pickensi* appears as minute slender rods and as cocco-bacilloid forms. In the hanging-drop, active brownian movements were observed but motility was not noticed, although repeated examinations were made. Diplo-bacilloid forms were also noticed. Short chains consisting of four or five organisms with their long axes parallel to each other were present. They measure from.5$\mu$x.9$\mu$ to .5$\mu$x1.5$\mu$. The ends are rounded and no spores are formed. They stain readily with the ordinary aniline dyes but give the best staining reaction with 1:10 aqueous dilution of carbol-fuchsin. They do not retain the stain when treated after the Gram method.

Cultural Characters. *Agar-Agar.* In twenty-four hours, an abundant growth is obtained when the organism had been growing on this medium for some time. When first isolated from the tissues, they do not readily grow; growth, however, may then be seen after forty-eight hours. The growth on agar-slant is abundant, filiform, raised, smooth and contoured. Along the stroke it spreads at the bottom of the tube covering almost the whole surface of the agar at this point. The water of condensation becomes turbid and a whitish sediment is formed. The upper part of the stroke reaches its limit of width in 72 hours, the width being 2 to 3 mm. The surface of the growth appears glistening and in very old cultures, a peculiar metallic lustre is observed on reflected light. On transmitted light the growth is opaque and of a greyish-white color. An odor resembling that of boiled shrimp is produced within the tube. When touched with the platinum needle, the consistency seems butyrous.

In stab cultures, the surface growth is restricted and that along the needle tract is scanty and filiform. The colonies on agar plates are punctiform and develop slowly. Under the low power of the microscope, they appear raised with smooth surfaces and entire borders. They are amorphous and present a brownish translucent appearance.

POTATO. No growth was detected on this medium.

NUTRIENT-BROTH. The growth in this medium is characteristic. The liquid becomes moderately turbid in 24 hours and remains so for a long time. A thin pellicle forms on the surface which is easily broken on slight agitation. It sinks to the bottom of the tube where a yellowish-white, flocculent sediment rapidly forms. A distinct heavy growth adhering to the wall of the tube forms a white ring at the level of the surface of the broth. The reaction remains neutral even after 48 hours.

GLUCOSE-BOUILLON. Gas is not produced in this medium. A viscid sediment collects at the bottom of the tube and no ring-formation takes place. The reaction is distinctly acid after 24 hours and remains so for at least two weeks.

LACTOSE-BOUILLON. Gas formation is not present. A heavy ring is formed on the wall of the tube. A flocculent sediment forms at the bottom. The reaction is distinctly alkaline after 24 hours and remains so for at least two weeks.

SACCHAROSE-BOUILLON. Gas is not formed. A distinct ring forms on the wall of the tube and a flocculent sediment collects at the bottom. The reaction is distinctly alkaline after 24 hours and remains so for at least two weeks.

MILK. A clearing without coagulation of the casein takes place very slowly in this medium. The reaction becomes faintly acid after 2 or 3 days.

LITMUS-MILK. No reduction occurs, the color remaining practically unchanged.

GELATIN. Growth is very slow and the medium is not liquified.

TEMPERATURE. The optimum temperature for growth is 37° C., the maximum is 50° C., and the minimum is 20° C.

RESISTANCE. A 1% carbolic acid solution kills the organism in five minutes. A temperature of 60° C. for five minutes is sufficient to destroy it. Exposures to direct sunlight in the month of March from 10 a. m. for three hours failed to kill the organisms while at four hours' exposure, no growth was obtained. This was

done by smearing a 24 hours' bouillon growth on sterile cover-slips contained in a sterile petri-dish and after the exposures the cover-slips were immersed in sterile bouillon. The tubes were then examined daily for turbidity up to four days' incubation at 37° C. Agar cultures kept in the incubator at 37° C. were found to contain virulent organisms after 48 days. Cultures 135 days old were found to be dead.

*Anërobiosis.* The organism is strictly aërobic.

Indol is not produced in Dunham's peptone medium. The organism was grown in bouillon for about 10 days and then subjected to filtration through a Berkefeld candle. Two mils of the filtrate when injected intraperitoneally into a few weeks' old guinea pig proved to be non-toxic. A 4 mils dose of a shake extract of a killed culture, injected intraperitoneally into another young pig, proved also to be without effect. Two-tenths of a mil of a 24 hours' bouillon culture injected subcutaneously was fatal for an adult guinea pig.

Symptoms. No opportunity was available for observation of the disease in the natural condition as it did not recur after sanitary measures were established. The writer came to Cornell for graduate work in October, 1917, and these experiments were undertaken in November. All the observations were therefore made in artificially infected animals.

The period of incubation was found to be three to four days. At the onset of the disease the animal becomes dull and the luster of the fur is lost. The coat becomes ruffled and has an unthrifty appearance. The animal "rounds itself up" and stands in a corner of the cage with half-closed eyes for intervals of time. A slight lacrymation is observed. The animal would perform masticatory actions, it would go to its food, take up a few kernels of maize, throw away half of the masticated amount and then it would drink with apparent thirst. In the feeding experiments, a majority of the pigs developed a submaxillary abscess which in some cases broke through the skin. Caseated pus could then be squeezed out. The cervical lymph glands become swollen and some undergo caseation. The animal sometimes elicits a cough and frequently a spasmodic trembling of the body has been observed. It soon loses its appetite, runs down in condition rapidly and becomes emaciated. The eyes are then sunken, the protuberances of the back and pelvis become salient, the animal when taken in the hand feels light and the bones of the skeleton can be easily traced with the fingers.

The two appended cases illustrate the clinical picture of the disease.

CASE 17. MARKINGS. Male, adult, white pig.

Jan. 15th, 1918. About 5 mils of a 24 hours' bouillon culture of the organism were mixed with the food and left in the cage so that the animal had free access to it.

Jan. 18th. A swelling the size of a hazel nut was noticed in the submaxillary region. The pig is dull and has a ruffled coat. It stands in a corner of the cage with half-closed eyes. Slight amount of lacrymation is observed. Every now and then it would mop its mouth with its two front feet.

Jan. 21st. Animal is very dull; "rounded up" in a corner of the cage. A small ulcer covered with dried pus is present at the left commissure of the lips. The submaxillary swelling is still hard. The respiration is labored and the temperature is 100.2° F. The leucocyte count is 44,000 per c. mm. Differential count revealed 34% of polymorphonuclears and 41.9% of lymphocytes.

Jan. 22nd. The animal is dull, with half-closed sunken eyes. It is losing flesh rapidly, has ruffled coat, would not eat and has a difficult respiration. The pellets of feces are hard and dry.

Jan. 23rd. It lies down flat on the abdomen practically all the time. A strong audible rattling sound is heard from its difficult respiration. Very weak. Is unable to stand up and when forced to move it slowly raises itself up, trembles in the act and walks for only a short distance with a wabbling motion. The thorax is "rounded".

Jan. 30th. Found dead and lying on its abdomen.

AUTOPSY. Typical nodules were present in the lungs, liver and spleen.

CASE 19. MARKINGS. White and tan, adult pig.

Jan. 15th, 1918. About 4 mils of a 24 hours' bouillon culture of the organism were mixed with the food, and left in the cage.

Jan. 16th. Ruffled coat; "rounds itself up" in a corner of the cage.

Jan. 22nd. Weak; dull; eyes are sunken and half closed. Stands isolated in a corner. The voice is weak and harsh; the respiration is difficult; shakes the body every now and then; emaciated. The leucocyte count is 35,000 per c. mm. Differential count shows 57% polymorphonuclears and 36% lymphocytes. Lies down on its abdomen most of the time.

Jan. 23rd. Found dead and lying on its abdomen.

AUTOPSY. Typical nodules were found in the lungs, liver and spleen.

In the course of the experiments, it was found that the leucocytes were increased to an average of 41,000 per c. mm. The red count was not materially increased. Differential counts revealed an average increase to 45% for the polymorphonuclears and to 43% for the lymphocytes.

The temperature rises to 102° F. at the height of the disease and falls to 95° F. just before death occurs. The average duration of the disease in feeding experiments is 10 days.

MORBID ANATOMY. The characteristic lesions consist of minute pearl-like nodules ranging from a pin-point to a large pin-head. Some may be conglomerate while others may be confluent, forming a large necrotic area, encapsulated by connective tissue. These nodules appear very similar to those of tuberculosis often produced in guinea pigs for diagnostic purposes. These characteristic nodules are found in the lungs, liver, and spleen. In one case (No. 11) the pancreas presented similar nodules grouped like clusters of grapes throughout the organ.

LUNGS. Multiple pearl-like nodules may be present in all the lobes. The majority of these nodules are raised while some appear only as white minute spots on the surface. They are not easily crushed with the knife, being quite resistant to pressure. On section through one of them, it is found to contain a yellowish-white, semi-dry pus. Calcification is never present. Several of these nodules may be fused to form a large necrotic area having a diameter of 5 mm. or more. In case No. 15, the whole mediastinal lobe became necrotic and a large white necrotic area of about 2 cm. in diameter was present in the right diaphragmatic lobe. The bronchial lymph glands are often enlarged and some are transformed into encapsulated abscesses containing semi-dry, thick, yellowish-white pus.

Microscopically, these nodules show a deeply stained necrotic center which is surrounded by a zone of leucocytes undergoing different stages of necrobiosis. Many large endothelial cells are also present which, with the leucocytes, fill up the lumina of the neighboring alveoli. A zone of connective tissue separates this necrotic area from the adjacent apparently healthy tissue. Many such areas may be confluent, forming a large one. In this instance,

the zone of connective tissue is not very distinct. The microscopical picture is very much like that of a miliary tubercle with the exception that giant cells are not observed. Calcification is not present. The neighboring blood vessels are distended with blood. Their walls are thickened and a zone of emigrating leucocytes is observed around them.

In some cases in which a severe infection was produced, a fibrinous exudate was found in the thoracic cavity; the pleura was reddened and nodules 2 mm. in diameter were observed attached to the thoracic wall.

LIVER. This organ is enlarged to twice its normal size and presents multiple pearl-like nodules the size of a pin-point to that of a large pin-head. In some cases a fibrino-purulent exudate is present in the peritoneal cavity, causing the liver, stomach, spleen and the anterior coils of the intestines to become adherent to each other. The color of the liver is dark-brown and its edges are thick. On section, the lobules are indistinct and the surface of the incision is covered with blood. The cut surfaces are convex. Histological sections through these nodules show them to consist of a necrotic center in which the cells have disappeared, the area being deeply stained throughout. Surrounding this necrotic center is a relatively wide zone of leucocytes, the ones toward the center undergoing necrobiosis. Some of the young endothelial cells show vesicular nuclei. Surrounding the zone of leucocytes is a zone of connective tissue, forming a distinct capsule. Giant cells are not present and calcification was not noticed. The surrounding liver cells show distinct cell-wall, granular cytoplasm and evidences of fatty degeneration. The central veins are engorged with blood and show a surrounding zone of emigrating leucocytes.

SPLEEN. This organ is swollen and is of a dark-brown color. The edges are rounded and on section the pulp can be easily scraped off with the knife.. On its surface, it presents multiple pearl-like nodules varying in size from that of a pin-point to that of a large pin-head. Some are raised while others, especially the small ones, are not. On section they are seen to contain caseated pus. Some of the nodules are conglomerate while others are confluent. Microscopically, they show the same picture as that described for those of the liver.

PANCREAS. Only in case No. 11 in which the infection was very severe, were numerous nodules present.

HEART. The epicardial blood vessels are injected, otherwise no morbid changes are discernible.

KIDNEYS. These are reddened and swollen; the renal capsule peels off easily. On section the cortex is lighter in color than the medulla. The incision is bloody, the blood vessels are prominent and the cut surfaces are convex.

ADRENALS. These are yellowish in color; are enlarged to twice their normal size and on section the cortex is light yellow while the medulla is brown. The cut surfaces are convex.

BRAIN AND MENINGES. The blood vessels of the meninges show arborization. The brain shows no discernible morbid changes.

EPICRISIS. The disease is easily reproduced by feeding cultures of the organism with the food. In one experiment, Case No. 13*, a culture of the organism was rubbed on the nose and the disease was not produced. Others at the same time were fed with the material from the same culture and they all died showing typical lesions. This seems to show that the most effective channel of infection is by means of the food. A submaxillary abscess frequently develops as a result of the organisms being filtered into this gland. The gland undergoes inflammatory reaction by the irritation subsequently set up by the organisms; the lymphoid cells are destroyed by the toxin produced; leucocytic infiltration occurs and the abscess may break through the skin or become encapsulated. The organisms may also be carried through the lymph channels into the succeeding cervical glands which subsequently become swollen. From here they may be carried into the thoracic duct from which they gain entrance into the circulation. They are then circulated throughout the body. They finally localize in the minute capillaries of the lungs, liver, and spleen. The neighboring cells undergo necrobiosis and the product of the degenerative changes act as an irritant which brings about an inflammatory reaction. The surrounding blood vessels become engorged with blood; the leucocytes marginate, after blood stasis has taken place; they pass through the blood vessel wall and invade the necrotic area in immense numbers. They are subsequently destroyed by the toxins produced and the necrotic area enlarges. Soon the endothelial cells of the blood vessels proliferate and give rise to the large phagocytic cells with vesicular nuclei often seen in histological sections. The sur-

*See appended tables.

rounding connective tissue also proliferates and forms a capsule around this necrotic spot, forming the characteristic nodules seen in the gross specimens. The functions of the lungs, liver, and spleen are greatly impaired. The nutrition becomes very poor, the animal becomes weak and dies of inanition.

The organisms when taken in large numbers may survive the action of the digestive juices. They then may pass through the mucous membrane of the intestines and gain access into the lacteals from where they may either be taken into the mesenteric glands or directly into the blood stream. Once in the circulation they are then distributed throughout the body and finally localize in the lungs, liver, and spleen.

TREATMENT. Thorough disinfection of the premises should be immediately instituted. Proper disposal of the dead and the killing of the affected are indicated. The ease with which the organism is killed by disinfectants and the institution of proper sanitary measures should promptly control any great loss to the breeder.

CONCLUSIONS. 1. A new infectious disease of guinea pigs the lesions of which are very similar to those of tuberculosis has been described.

2. The causative agent of this disease is given the proposed name of *Bacterium pickensi.*

ACKNOWLEDGMENT. Acknowledgment and thanks are due Dr. Pickens for his invaluable help and suggestions and also for the culture of the organism. To Dr. V. A. Moore my gratitude is also expressed for his wise advice and the use of the laboratory.

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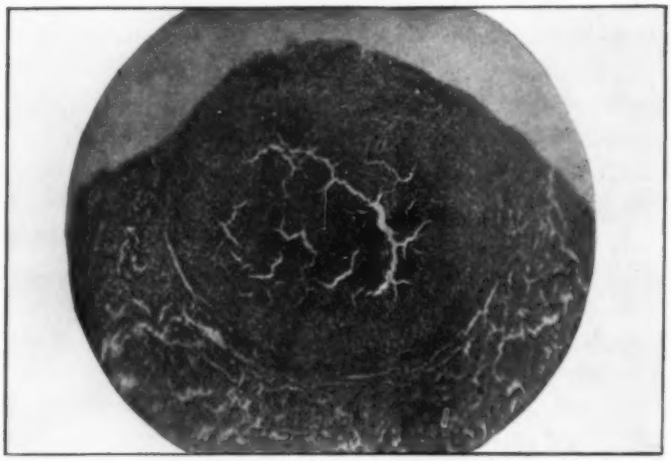

FIGURE I. Photomicrograph of a nodule in the spleen. This lesion is typical of those observed in this as well as the other organs. The necrotic centre and the contiguous zone of round cells may be distinguished. The reactionary zone is not well marked here. Mag. 55 diam.

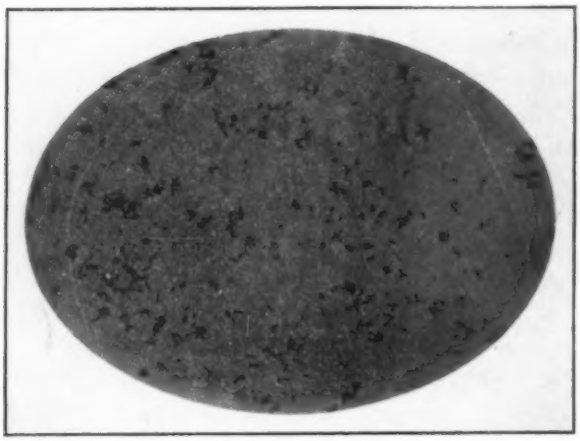

FIG. II. Photomicrograph of the causative agent of this disease, *Bact. pickensi*. The preparation was made from a 24-hour bouillon culture of the organism and was stained with a 1 to 10 aqueous dilution of carbol fuchsin, slightly decolorized with 95% alcohol. Mag. 750 diam.

INOCULATION EXPERIMENTS

| No. | Color | Method | Amt. injected | Date of Inoculation | Date of Death | No. of days | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | Tan, black stripes | Inj. subcutaneously | 1 c.c. | Oct. 23, 1917 | Nov.12, 1917 | 11 days | Nodules present in the spleen and liver |
| 2 | Tan, white on face | Inj. intraperitoneally | ¼ c.c. | Oct. 23, 1917 | Oct. 27, 1917 | 4 days | Nodules present in mesenteric lymph gland |
| 3 | Black | Inj. intraperitoneally | ½ c.c. | Nov. 1, 1917 | Nov. 4, 1917 | 3 days | Nodules present in spleen, liver, lungs and peritoneum |
| 4 | Tan, white on right side of face | Inj. intraperitoneally | ¾ c.c. | Nov. 1, 1917 | Nov. 4, 1917 | 3 days | Nodules present in spleen, liver and lungs |
| 5 | Black and White | Inj. intraperitoneally | ½ c.c. | Nov. 1, 1917 | Nov. 2, 1917 | 1 day | Died of fibrinous peritonitis. No nodules |
| 6 | Tan, large | Inj. subcutaneously | ½ c.c. | Nov.15, 1917 | ..... | ..... | Recovered |
| 7 | Black and White | Inj. subcutaneously | ½ c.c. | Nov.15, 1917 | Nov.18, 1917 | 3 days | Nodules present in lungs; microscopically focal necrosis found in the liver and spleen |
| 8 | Tan and White | Inj. subcutaneously | ½ c.c. | Nov.15, 1917 | Nov.16, 1917 | 1 day | Nodules absent. Organisms recovered from liver and spleen |
| 9 | Tan small | Inj. subcutaneously | .2 c.c. | Dec. 5,1917 | Dec. 15,1917 | 10 days | Nodules present in liver, spleen, lungs and peritoneum |
| 10 | Squirrel, white nose | Inj. subcutaneously | .3 c.c. | Dec. 5,1917 | Dec. 6,1917 | 1 day | Died of pneumonia |
| 11 | Tan and White | Inj. subcutaneously | .2 c.c. | Dec. 12,1917 | Dec. 15,1917 | 5 days | Nodules present in lungs, pleura, spleen, pancreas, liver and peritoneum |

FEEDING EXPERIMENTS

| No. | Color | Method | Amt. | Date of Experiment | Date of Death | No. of days | Remarks |
|---|---|---|---|---|---|---|---|
| 12 | Tan, small | Introduced into mouth with pipette | 1 c.c. | Dec. 12, 1917 | Jan. 2, 1918 | 21 days | Nodules present in lungs, liver and spleen |
| 13 | Mouse color | Rubber on nose | ..... | Dec. 12, 1917 | ..... | ..... | Still alive |
| 14 | Mouse small | Mixed in food | 4 c.c.* | Dec. 12, 1917 | Jan. 2, 1918 | 21 days | Nodules present in liver, spleen and lungs |
| 15 | Black and White | Mixed in food | 2 c.c.* | Dec. 12, 1917 | Dec. 31, 1917 | 19 days | Nodules present in liver, spleen and lungs |
| 16 | Tan small | Mixed in food | 4 c.c.* | Dec. 12, 1917 | Dec. 21, 1917 | 9 days | Submaxillary abscess noticed. Killed and no nodules found in the organs |
| 17 | White | Mixed in food | 4 c.c.* | Jan.15, 1918 | Jan.30, 1918 | 18 days | Nodules present in liver, spleen, lungs and cervical lymph glands |
| 18 | Black | Mixed in food | 4 c.c.* | Jan.15, 1918 | Jan.23, 1918 | 8 days | Nodules absent, organism recovered from submaxillary abscess |
| 19 | White and Tan | Mixed in food | 4 c.c.* | Jan.15, 1918 | Jan.23, 1918 | 8 days | Nodules present in liver, spleen and lungs |
| 20 | Mouse color | Mixed in drinking water | 4 c.c.* | Feb.25, 1918 | Mar. 6, 1918 | 9 days | Nodules present in mesenteric gland |

*About 4 c.c. of 24 hours' growth suspended in bouillon was mixed with a handful of maize. This was left in the cage so that the animal had free access to it.

# CLINICAL AND CASE REPORTS

## FURTHER NOTES ON CONTROL OF GOITER IN THE NEW-BORN

HOWARD WELCH, Bozeman, Mont.

Certain sections in the northwest have for years been seriously hampered in their efforts at livestock production by the fact that a large percentage of the new-born domestic animals every year were goitered and otherwise so defective that they died. Pigs were hairless, showed extreme myxedema, and were born dead or

FIG. 1. Hairless Pig (Berkshire)
(*Bull. 119*, Agl. Exp. Sta., Bozeman, Mont.)

died in a few hours. Lambs and calves were similarly affected, though to a less degree. Foals, while seldom hairless, were weak, unable to stand, and soon died. It was not recognized that all these losses were due to the same cause until investigation at about the same time, by the Washington Experiment Station at Pullman and the Montana Station at Bozeman, showed that goiter and its allied conditions were responsible for the trouble.

Since we could easily demonstrate a deficiency of iodine in the defective young, we began feeding iodine to the pregnant females as an attempt at correcting the condition. We attempted to demonstrate a shortage of iodine in the agricultural products of

the affected areas, but failed to do so. Nevertheless, the iodine feeding was a huge success from the first.

Our first experimental feeding was with sows and ewes, and the results, with less than a thousand females fed iodine, were so striking that we published a bulletin in the fall of 1917.

At the same time we inaugurated a campaign for a wider use of iodine in the affected areas, and by midwinter we distributed iodine to about 1600 sows, 1200 ewes, and a hundred mares and cows. These were located in Washington, Montana, North and South Dakota, Wyoming, and Canada, and were all on ranches where had occurred goiter for several years previous. The iodine was administered as potassium iodide in widely differing doses.

FIG. 2. Typical litter of hairless pigs
(*Bull. 119*, Agl. Exp. Sta., Bozeman, Mont.)

Some animals were fed 2 grains daily, some 1, and some ½ grain daily. Some received 2 grains twice a week, some 2 grains once a week. The females fed have all produced vigorous, normal young, and in no case has any tendency toward goiter been observed. There were no check experiments run, as we were reasonably certain of results, and the present great need for livestock production was greater than the need for additional proof of the efficacy of the iodine.

Though beyond a doubt a small amount of iodine will prevent the occurrence of goiter in the new-born, the cause of the trouble is still hazy. In Montana we have two distinct types of the malady; one in definite districts which we call "affected areas", where hairless pigs and goitered lambs and calves occur every year; and the

other, or sporadic type, which occurs irregularly here and there, and is without doubt due to a poorly balanced ration.

Dr. E. B. Hart, in the February number of the *Journal of Biological Chemistry*, throws light on this phase of the trouble. He has produced the identical condition in pigs by feeding a ration with a high protein content, with insufficient roughage. Curiously enough, iodine fed to a sow on this ration served to produce normal pigs, which apparently indicates that this type of ration in some

FIG. 3. New-born Lamb showing goiter and very little wool (*Bull. 119*, Agl. Exp. Sta., Bozeman, Mont.)

manner interferes with thyroid metabolism and proper iodine assimilation.

But a faulty system of feeding cannot be the cause in the so-called affected areas. It is inconceivable that in an area like the Yellowstone Valley, about 400 miles long and from 5 to 50 miles wide, the ranchers every year should so mismanage their feeding that nearly one-half of the new-born animals would be defective. More than that, several feeding experiments in this valley, using carefully balanced rations, failed to correct the trouble. Further investigation will be necessary to definitely establish the cause of the endemic goiters.

Meanwhile, the method of control should be developed. Without doubt we have been feeding more iodine than was necessary. The cost of the treatment we estimated at about 50 cents per head, feeding 2 grains of potassium iodide daily for 90 to 100 days. This included a sugar of milk vehicle, 1 dram daily, and packing and mailing to the stockman. This cost can doubtless be much reduced, though the present figure seems low enough when compared with the results obtained. We do not know what the lowest advisable dose of iodine may be, though we have shown that anything over two grains daily is wasted. We have proved that the iodine must be supplied to the female during the early part of the gestation period, for in several instances even large doses of iodine failed to produce results when fed for the last 25 to 30 days of the period. We believe that potassium iodide, with some sort of dry diluent, is the most satisfactory way to feed iodine. A solution of the iodide was the most obvious method, but breakage of bottles in transit, by freezing, etc., made it inadvisable to use this method. It may be possible to find a cheaper iodine bearing feed than the rather expensive potassium iodide, or better yet, a system of feeding, even in the affected areas, that will render unnecessary the use of iodine in any form.

## LAMENESS

J. E. Nance, Stillwater, Okla.

Some months ago, a brown mare weighing about 900 pounds was brought to the veterinary hospital of the Agricultural and Mechanical College at Stillwater. The owner stated that this animal had been found lame in the right hind leg one morning and he had supposed that she had been kicked by a mule, but no swelling or injured place was noticed by him.

No positive diagnosis was made at the time the mare was brought.

Being very lame and the case a chronic one (at least of two years' standing) the owner was advised that treatment was useless. He consented to leave the animal to be used as a dissecting subject.

The writer first saw this case in August of last year. At that time the following symptoms were noted: no swelling or external

lesion visible. No difficulty in extending the leg but marked lameness when weight was thrown on that limb. At times the leg was carried and when standing was always rested. Some adduction.

FIGURE I

FIGURE II Femur from Fig. 1

No noticeable soreness on palpation but when the leg was flexed, as in the spavin test, pain was evidenced. Some atrophy of the glu-

teal and crural muscles. Mare in very good flesh. This subject was destroyed about January first of this year and used as a dissecting subject.

On examination of the right stifle joint after cutting away the tissues, a diseased condition of the lateral condyle of the femur was found to exist. With the exception of the inferior surface of this structure, the affected bone had a spongy, rough, uneven appearance and was studded in places with small exostoses.

The striking features of this case, to me, were the marked lameness shown, and the absence of any lesions or symptoms upon which a positive diagnosis could be made ante mortem.

## PERVERSE DIGESTION IN YOUNG RUMINANTS*

GEORGE B. JONES, Sidell, Ill.

The incentive by which we were prompted in the attempt to write a paper on this subject was the lack of any knowledge except that obtained by our own observations, but we hope by bringing the subject before this association to get the opinion and the experiences of those present and from this information form a nucleus for further investigations.

In searching veterinary literature from Genesis to Revelations we have as yet been unable to find a word of enlightenment on the subject, therefore, what we shall attempt to say will be mainly a record of our personal observations.

The title of this subject may be a misnomer, but it was given because of the lack of knowledge for a better name, but we hope to be able to describe the ailment so that you then can give it any name that may suit your individual idea.

This trouble is observed in young calves and lambs ranging in ages from three to twelve weeks, or at the time these young animals cease to depend wholly upon a milk diet but are beginning to partake of a solid diet such as grass, hay, straw, etc.

The time the trouble may occur depends upon the opportunities these animals may have had for obtaining solid food. Some calves are restrained in a dry lot with nothing but a milk diet until they are two or three months of age, while others may have access

*Read at the Ohio Valley Veterinary Medical Association, Terre Haute, Ind., Feb. 26, 1918.

to all kinds of food from birth. As a result of these different environments we can attribute the great range of time or age at which this trouble may occur.

It might be further stated that the tender green grass is not so liable to bring about the trouble as matured grass, hay or straw. My observations have been that over-ripened blue-grass tops is a very potent factor in producing the trouble and more especially in lambs.

In calves that are confined for the first few weeks in dry lots, with only a liquid diet, and are afterwards turned out to pasture it seems that most any kind of forage will produce the trouble. In one instance we recall where five calves had been confined in a dry lot for six weeks then turned to grass and shortly afterwards all became afflicted, although not all on the same day.

As a general rule in calves we see this ailment only in solitary cases while in lambs we may find several afflicted at the same time. This difference no doubt can be accounted for by the greater number of lambs of the same age compared to the number of calves of one age.

It might also be stated that more of this trouble is seen in dry seasons, and this, no doubt, is caused by the tough and woody condition of the grass.

While there are only a small percentage of the calves born during the winter months, a greater percentage of them become afflicted than those born during the spring and summer months.

In the breeding districts this trouble is far more prevalent than is supposed, but on account of it not being contagious and there usually being only an isolated case now and then the average farmer takes but little cognizance of the trouble.

We have never tried to get exact data on the cases but it is my belief that at least five per cent of the calf crop become afflicted, and without treatment nearly all afflicted ones die.

In order to get a better understanding of the cause of this trouble we will consider a few theoretical ideas, on digestion and rumination. Physiologically speaking the rumen is very small and poorly developed in the young animal while living wholly upon a liquid diet; in fact, it might be said that the rumen is dormant and inconsequential as far as the welfare of the animal is concerned for the first few days of its life.

If true, as claimed, that there are no alkaline secretions while

the young animal is living on a milk diet, these alkaline glands are also dormant until the animal begins to partake of solid food. The act of rumination is wholly unknown while the animal is living only on a liquid diet, and in no wise aids digestion.

When the time comes and the animal is permitted to partake of solid food three radical changes are brought about.

First, the small and inactive rumen must expand and begin its peristaltic action; second, the dormant alkaline glands must begin secreting their juices in order to assist the digestion of these new solid foods; third, the act of regurgitation and remasticating of these solid foods must begin.

These three things are all now of vital importance to the well being of the young animal, and if any one of them should fail in its function a derangement of digestion would follow.

That we have a derangement of some of these functions is certain and as a result we have grassy or woody concretions resembling hair balls in the stomachs and bowels. These concretions are not egagropiles but balls formed from whatever solid foods the animal may have partaken. These balls may range in size from that of a small marble up to that of a hen's egg.

Symptoms. As stated before, the ailment is usually seen in the animal that is from three to twelve weeks of age. The animal is gaunt, weak, eyes staring, grinds its teeth, and is more or less delirious. These symptoms are usually preceded by constipation, although some cases may show a slight or profuse diarrhoea.

As a typical case we will consider one where the calf is nursing its mother each night and morning. He may nurse all right this morning, but tonight when he is turned to his mother he walks up to her, gives the udder two or three hunches, grinds his teeth, but refuses to nurse. Later he will muss around the udder as though unable to nurse, saliva may drip from his mouth, looks wild out of his eyes, staggers away from his mother, falls down apparently in a fit, gets up and walks or runs into the fence only to fall again, then have a few more fits when death closes the scene. In prolonged cases the animal may stand in a secluded corner and bellow as though it were actually starving.

A very peculiar thing, in the more severe and protracted cases that recover, is that they will absolutely refuse again to nurse the mother.

In lambs we notice similar symptoms although they succumb more quickly than the calf.

TREATMENT. Oil and stimulants given in small doses three or four times a day and continued until the bowels are thoroughly cleared. In severe cases it may require this treatment for three or four days in order to obtain the desired effect.

My experience has been that it is beneficial to follow up with a few doses of lime water during convalescence.

In those cases where recovery is slow the calf should be given a quart of fresh milk three times a day as a drench because they sometimes die of sheer starvation on account of the deranged brain being slow to return to a normal condition.

## AMAUROSIS AND AMBLYOPIA IN DOG AND CAT

OSCAR SCHRECK, New Haven, Conn.

There is so little written in our veterinary journals or text books, about this very important, but fairly uncommon, ailment, that it prompts me to report my success with the treatment of the disease. By amaurosis we understand blindness, occurring without apparent lesion of the eye, and its inability is dependent upon certain material changes. After considerable study and observation I have come to believe the condition, seen in the dog and cat is more of an atony or paresis of the optic nerve. Keeping this in mind the following treatment was given in five cases with the best results, but I wish to impress upon the minds of those who have a case of this kind not to expect to work wonders over night, as it generally takes a few weeks of treatment, and I believe this treatment will cure nearly all curable cases. It has proved in my hands the most satisfactory prescription in the above disease. The dose may seem large to some, but I claim we must give large doses in this disease to get results, and results are what count. The two prescriptions given below were given to a full grown English setter, in smaller animals you must reduce the dose to suit the animal in hand, and watch the action of your drugs.

I always begin my treatment by freeing the bowels well at the start with the following:

℞ Resin Podophylli.....Grains X
Aloin Powd.....Grains X

Ipecac Powd.....Grains V
Fel. Bovis Insp.....Grains L
Misce. et. Fiat. Capsules No. X
Sig. One capsule T. I. D. after feeding

After the bowels have acted good and strong the following is used:

℞ Strychnine Sulph.
Acidi Arsenosi, aa.....Grain SS
Ext. Sumbul.....Grains XXX
Ferri Subcarbonatis.....Grains L
Quinine Valeriate
Assafetida, aa.....dr. I
Misce. et. Fiat. Caps. No. XXIV
Sig. One Capsule T. I. D.

The food should be nutritious, generous, and easy of digestion, as constipation often depends on the first stage of digestion being imperfect.

## ABSTRACTS FROM RECENT LITERATURE

SWINE PLAGUE IN MAN. M. Thomsen. Abstracted from "Hospitalstidende", Copenhagen, February 13, 1918. Copied from *The Journal of the American Medical Association*, Volume 70, No. 17, April 27, 1918.—Thomsen has encountered three cases of a lesion on the hand, resembling erysipelas, with lymphangitis running up the arm, nausea and fever.

The first patient was a veterinarian and the diagnosis of swine plague was followed by injection of 10 c.c. of the antiserum. In less than an hour the malaise had subsided and in four days recovery was complete except for a little stiffness in the arm. The man had been giving the antiserum to a sick hog four days before his own sickness.

The farmer's wife who had helped to hold the hog during the injection got some blood on her hand and a small lesion developed. After failure of other measures, an injection of 10 c.c. of the antiserum cured the lesion in three days.

In another family a hog taken suddenly sick was slaughtered, and the farmer's wife developed the same clinical picture as in the first two cases. It dragged along untreated for two months and

then subsided. One meal was made from the pork but all eating it were taken with severe diarrhea and the rest of the carcass was buried. M. J. HARKINS.

PRELIMINARY REPORT ON THE VIRULENCE OF CERTAIN BODY ORGANS IN RINDERPEST. William Hutchins Boynton. *The Philippine Agricultural Review.* Volume X, No. 4.—The tissues used in the experimental work were liver, spleen, lymph glands, heart, intestines, thymus, skeletal muscle, larynx, pharynx and back of tongue. They came from animals dead from rinderpest either having been bled to death for virulent blood or having died in the regular course of the disease. The tissues were extracted with a 0.5%, 0.75%, 1% and 2% phenol solution. The extraction was made under sterile conditions.

The animals into which the extracts were injected to test their virulence were chosen for their high degree of susceptibility. They were closely watched in order to be sure that the disease did not develop from any source other than the injection of the extracted material.

The extracts worked as readily on animals outside of the laboratory as they did in the author's research work. It is most advisable to use a 0.75% phenol extract not over 15 days old.

From the results obtained in working with rinderpest the author suggests that similar or even better results may be obtained with the virus of hog cholera along similar lines. The liver, spleen, lymph glands, heart, fourth stomach, cecum and colon were found to be the organs best adapted to the work. HAYDEN.

GLANDERS IN FELINES. M. Carpano. Abstracted from *"Annali d'Igiene"*, Rome. Copied from *The Journal of the American Medical Association*, Volume 70, No. 17, April 27, 1918.—Carpano found signs of acute glanders in the lungs of a tiger dying in captivity at Rome, and others have reported similar findings in lions and cats. The zoological gardens at Rome recently had an epizootic of acute glanders among the lions and tigers but the other animals escaped. Twelve of the large felines were affected and a number died. Cats inoculated from them developed the same set of symptoms in from three to five days, while other cats infected naturally from these cats showed an incubation period of six or seven days. The temperature, however, ran up the end of the fourth day.

M. J. HARKINS.

ABORTION DISEASE IN CATTLE. L. Van Es. *Circular 18,* North Dakota Agricultural Experiment Station.—Abortion due to disease of the uterine mucous membrane and of the fetal membranes is much more common than other forms. The organism is found in the udder, vaginal discharges and in the infected uterus from which abortion has taken place. Animals may be infected through the genital organs, the digestive tract, and by means of the infective material carried by unclean attendants. The infected cow as well as the bull may serve as carriers of the disease. There is a possibility of reinfection. A calf that survives when born of an infected dam may be a carrier of the disease. The lesions produced by abortion infection are quite constant and aid greatly in the diagnosis of the disease. A certain degree of immunity is developed. The symptoms of an approaching abortion are very much like those of normal parturition. The complement fixation and agglutination tests are used to determine the disease. There is no notable degree of mortality in aborting animals. There is often a serious loss in production. There are no remedies that can be depended upon to eradicate the infection from the body. Isolation, comfortable quarters, removal of the afterbirth if necessary, and thorough disinfection of the parts are attentions that should be given the aborting animal. A frequent cleansing and disinfection of animals and premises will help to keep down the disease. HAYDEN.

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THE CULTURE OF THE PARASITE OF EPIZOOTIC LYMPHANGITIS AND THE EXPERIMENTAL PRODUCTION OF THE DISEASE IN THE HORSE IN FRANCE. Boquet, A., and Negre, L. *Comptes rendus des Séances de l'Academie des Sciences,* Year CLXVI, No. 7, pp. 308-311. (Abstract in *Internat. Rev. Sci. and Pract. of Agriculture,* April, 1918.)—Epizootic lymphangitis, "African farcy", is caused by a specific parasite discovered by Rivolta and placed by him in the Blastomyces—*cryptococcus farciniosus.* In spite of the researches of Tokishige, Marcone and Sanfelice the nature of the parasite was still doubted as, of late, certain authors considered it to be a protozoon.

The authors have shown, by their researches, the nature of Rivolta's cryptococcus by the growth of the parasite as mycelium in cultures which could be propagated and by the experimental production of the disease by inoculating these cultures into the

horse. The experiments are fully described. Further work on vaccination and bacteriotherapy by means of heated cultures is in progress. FISH.

A NOTE ON JHOOLING IN CAMELS. H. E. Cross. *Bulletin No. 72*, 1917. Agricultural Research Institute, Pusa, India.—Jhooling is a contagious disease of camels. It is manifested by the formation of local tumors which are hot and painful and terminate in suppuration and raw patches. The cause is probably a fungus. In the main it is a cold weather disease. Lesions occur as a rule on the neck, hindquarters or testicle. Several lesions appear and the camel loses condition. As the wounds heal small white patches persist for several months. In the treatment of the lesions a red iodide of mercury blister left on for three days is recommended. This is washed off with soap and water and then the diseased area is excised. Three dressings of permanganate of potash, well rubbed in, are applied at intervals of four days. Prevention is brought about by the isolation of the diseased camels. HAYDEN.

PYOTHERAPY IN EPIZOOTIC LYMPHANGITIS: RESEARCHES IN ITALY. Lanfranchi, A., and Bardelli, P. *Il Moderno Zooiatro*, Series V, Year VI, No. 12, pp. 261-275. (Abstract in *Internat. Rev. Sci. and Pract. of Agriculture*, March, 1918.)—After summarizing the work carried out by Mangan, Belin and Velu on pyotherapy, the authors give a detailed description of their treatment of epizootic lymphangitis by means of pyotherapy, which has given completely negative results. "In all the animals treated, whether the lesions were slight, of moderate severity, or severe, the two series of six injections (each of 2 c.c. of pyovaccine) with an interval of eight days, caused no diminution of the progress of the disease," even with subjects used as controls, during the experiment, it was found that the injections of pyovaccine "have accelerated and aggravated the disease". Therefore, according to the authors, at the present state of our knowledge, autotherapy and pyotherapy are not methods of treatment the use of which could be advised in epizootic lymphangitis. FISH.

—Dr. J. H. Bux has been transferred from Topeka, Kans., to Little Rock, Ark.

# ARMY VETERINARY SERVICE

## TRANSPORT SERVICE*

## (The Innocent Abroad)

D. A. McAuslin, Brooklyn, N. Y.

Of all the component parts of the armies in this, the greatest of wars, no part is, to my mind, so absolutely innocent of having in any way played a part in bringing it about; none so essential in anything other than the actual fighting; none which has had so little voice as to whether he goes or stays and none so willing in the performance of his work, no matter how hazardous, as that of our equine friends, the army horse and mule. They are called upon to do the work when power machines fail, and it is due to the fact that they perform this work so creditably that they are retained in the face of all statistics compiled by the alert efficiency expert and salesman. It is not this work that I wish to bring to your attention but the lack of appreciation shown them for performances done or to be done. In seven voyages to Italy I have often wondered if it would be possible to destroy some horses that have gone through the ministrations of some of the so-called ocean-going veterinarians.

My first departure from New York was on the Italian Steamship *Taormina*—a large passenger-carrying ship before the war. The upper portions, reserved for horses, were fairly good, being the third-class passenger sections, but the lower decks could have been greatly improved so far as ventilation and drainage were concerned. The consignment consisted of 1076 horses and 150 mules, the latter rejects from former consignments. For four days previous to sailing these mules had been under my charge and treatment at the railway stockyards, and I was able to get a good line as to what was in store for me. They certainly were a sorry collection and were well styled "rejects"; but as they were a source of expense it was decided that I should endeavor to make the best of things and they were placed in a well ventilated part of the ship before the horses came alongside. The horses were transferred from the railway to the ship in the regulation double-decked cattle barge and loaded directly from its upper deck to the main deck of the ship and taken to the spaces allotted them in the holds,

*Read at the December, 1917, Meeting of the Veterinary Medical Association of New York City.

which on this vessel, numbered six, each three decks down. They were led singly from the barge by the crew who were to go over with them. They were given the halter-shank by the barge man and inasmuch as some of these men had never handled a horse before, it took considerable watching to prevent their being injured. We were fortunate in not having anyone injured. About 40% of the horsemen came on board intoxicated. It has been my experience since that it is these men who invariably make the best workers, as others, in a great many cases, are out for a joy ride, and when compelled to do their share have to be watched carefully or they would neglect to feed and water properly; while the "rummy", when sobered up, will invariably attend to his charges without being told and in the majority of cases is willing to do little things outside of his duties, and he is more easily handled. Especially is this true if you expend a little money on smoking tobacco and cigarette papers. In this way you can satisfy his desire for smoking which seems to be greatest, and curb the desire for alcohol by cutting off the tobacco. I have found that I only required to do this once, and within three days they were willing to do anything for a sack of tobacco and papers.

In reference to ailments, the first three shipments were as choice a collection of sick animals as could be found—pulmonary infections with their various sequelae, were the principal source of trouble. With the limited space allowed (2 ft. 4 inches wide by 8 ft. long and a head-room at the most 8 ft. high, making a total airspace of 150 cu. ft. for each animal, with aisles 3 ft. wide and both rows of animals' heads projecting into it), it was no easy matter to treat them. An ugly animal made matters worse.

On leaving port I found it much to my advantage on Italian ships to get in touch at once with the commissary officer who had charge of the food, and ascertain from him the food rations allowed by the ship. In the meanwhile the foreman, under instructions, arranged the men in messes of not more than six and gave each man a berth supplied with a straw mattress, blankets and a pillow, for which they were held responsible. When this was finished, they lined up at the cook's galley, and the ship's commissary issued the mess gear to each man individually, and to two in each gang, selected by themselves, the large pans for their food, etc. These two men obtained the rations for the six in that mess, and in this way much confusion was avoided. Also, if the food was not

what was desired, or what it should be, one could check back very easily. Wine I always issued myself with the assistance of the foreman, only on holidays and Sundays, and at night after feeding and watering. I found this little personal touch was very much appreciated.

In reference to the feeding and watering of the stock I found that, if the animals were fed a fair ration of good quality hay—about 6 to 8 lbs. in the morning and 10 lbs. at night—I did not get the same number of cases of azoturia which are so troublesome to handle aboard ship. A bran mash was given every third day and a generous portion of salt mixed in, and twice a week a handful of salt was given each animal—the same being placed on the iron deck immediately in front of each stall.

The day before arriving at Gibraltar, where we had to put in for inspection, as all ships are compelled to do, a count of all feed and hay was made and the animals got their first feed of oats in the ratio of bran four, oats one. This quantity of oats was increased each day for the next 3 days, when the bran was exhausted as per schedule, and the last two midday meals were usually oats straight. In this way the animals usually went off in fine fettle. For sick horses which would not eat oats or other fodder, I carried a few sacks of corn-on-the-cob; and as a great many of these horses were corn-fed before starting on their journey, I found it very helpful in restoring jaded appetites.

In reference to water, I was guided a great deal by the temperature of the holds, which was taken at midday, and in this way I could obtain a line of the requirements of the animals almost individually. In the winter months, or when the weather was cold, watering morning and night was sufficient, and they were not stinted in any way. If, however, the weather became warm, they were watered three times a day, and in the very hot weather four times a day—each horse, from an individaul round-bottomed bucket of galvanized iron suspended from the breast-board, which was also used for feeding the grain ration. It was the duty of the foreman and his assistants to take full charge of the feeding and watering. I always found the time to be on my rounds when this was being done, as in this way I was able to spot many an animal which was coming down with some ailment and be in a better position to combat it. It was the ventilation upon which I laid the most stress. On the *S. S. Taormina* I utilized the thermo-tank system of

forced air wherever it was possible and 16 canvas ventilators or wind-sails. On the *S. S. Stampalia,* in addition to the thermo-tanks, 12 canvas ventilators, and on the *Caserta* I had to depend on the canvas ventilators only. It required constant vigilance and supervision to see that these were properly trimmed at each change of wind. In bad weather a man was stationed at each hold to watch the port-holes, which were open whenever possible. On these ships I was most ably supported in this work by the captains and their officers, who were untiring in their efforts to land as many animals as possible. They made things as easy for me as possible, and my association with these gentlemen will always be a source of pleasant recollection.

The cleaning out of the manure is a much-discussed question. Personally I do not favor the daily cleaning of the stalls. First: if it is rough weather you have the animals deprived of footing, and as the racks are wet and slimp, they will go down and in many cases injure themselves most severely. This could be avoided if a fair and reasonable amount of droppings were allowed to remain underfoot, which would give a good secure foothold whether the animal be shod or not. Second: to clean the stalls you have to take the animals out and crowd them into a space already as full as possible consistent with safety. Some of the men or some of the animals are usually hurt, either by kicks or getting down. The only objection to not cleaning is the decomposition of the manure and the urine, with the resultant ammoniacal vapors. This I counteracted as much as possible by daily spraying with a good strong disinfectant solution which I had put in a portable tank and forced out by air pressure in the form of a jet instead of a spray. In the form of a spray it would strike the legs of the animal already irritated by the splashing of the urine and produce nasty sores. This condition was obviated by the straight jet. The tank was placed in as competent hands as possible and the work was done at night, usually by one of the night watchmen.

In reference to the treatment of sick animals, as has been noted before, it was usually impossible to move them once they were placed in the holds. It was my custom to make as close and careful an inspection of the animals as possible when they came off the barge, and have any sick animals placed on deck or some other well ventilated portion of the ship where they could be under better observation and were convenient to get at. I always included any

animal that lagged back upon the rope even if he showed no other symptom, as invariably these laggards were taken down with a serious trouble in a short time if not taken in hand at once.

Taking temperatures was out of the question, the principal dependence being placed upon the pulse, respiration and mucous membranes of the eye. Wherever a sick animal was placed, the diagnosis was marked on the headboard in black crayon and instructions to assistant and foreman were included from time to time. If animals were shifted in the cleaning of the stalls, great care had to be taken to see that the animals were returned to their proper stalls, for if changed great harm was apt to be done in that sick animals would be neglected. In such cases death is very often a result, and is another objection to daily cleaning.

As far as treatment is concerned, supportive measures in my opinion are always indicated. In the pneumonia cases, phylacogens were used with very excellent results. On one voyage a record was kept of each case and it showed that out of 150 odd cases of pneumonia, the loss was but 8, and post mortem showed well-developed cases of pleurisy with adhesions. It also showed extreme dilation of the heart which, in one instance, when put upon the scales, weighed 11 lbs. 14 oz. The walls of the ventricles were thickened out of all proportion and of a very inferior consistency. This condition was produced, in my opinion, in conjunction with other conditions present, by the injudicious use of strychnine, which seems to be the sovereign agent of those not competent to judge of its action. Purpura was quite prevalent, but of all the cases treated only one died, and that one lived less than 12 hours after being detected. The treatment consisted of ammonium chloride and potassium dichromate, in solution, internally and applications of tinct. iodine externally applied with friction. When the symptoms showed signs of subsiding dilute chloride of iron solution was administered. This treatment was never changed; the results obtained, as noted, being in my opinion satisfactory. On the last three voyages considerable annoyance and hard work was caused by infectious stomatitis. I had been aware that it was quite prevalent at the yards, and had been fortunate in having only a few isolated cases. The three voyages referred to saw it well established on board—so much so that I was enabled to detect some of these cases by the odor. These cases which at one time numbered over 350, treated on one trip, were first treated by a

solution of potassium permanganate, alum and boric acid, but owing to the effect of the continued use of this mixture upon my hands and arms, I discontinued it for a solution of potassium chlorate and hot sea water. This I think gave me much better results upon a very severe case and required more than four washings of this. This was done by means of a force pump and an 8 ft. enema hose. The latter was passed into the mouth between the teeth and cheek as far back as the angle of the jaw and about 2 qts. of the solution slowly pumped from a pail by an assistant. Very little trouble was experienced if done quietly. Care was taken that the animals affected did not drink or feed from any other than their own pails, and to this end the sides of the stall were slatted to prevent them reaching to either side. The only instance in which this infection caused real damage was when it attacked an animal suffering from some serious depleting disease, such as pneumonia, and prevented his eating; the animal being weakened by lack of nourishment. As a direct and sole cause of mortality I never saw a case although a number were reported.

Abortion was quite common, a half dozen or more occurring every voyage, but in every case still-born; although we had a number that had almost reached maturity. To my mind, it is a crime against the shippers to ever put mares in advanced pregnancy aboard a horse transport, as invariably if there is heavy weather they will abort. It is running an unnecessary risk which could be easily avoided. Records have been shown me of deaths of mares after they had aborted.

As far as surgery goes, very little could be done—owing to surroundings—outside of opening abscesses from strangles and on the buttocks. In reference to abscesses on the buttocks, this is caused by continued chafing on the end boards and is apt to prove very serious if not remedied.

The animals, when unloaded in Italy, were taken in hand by soldiers at the land end of the gangway and loaded direct into box cars and taken inland to the various concentration and remount camps. It was here that I first saw the treatment that suggested the title of this paper. These box cars are about a third the length of our box cars which carry from 21-22 horses or 24-26 mules, according to size; but they packed 11 horses or 14-15 mules. To get them to enter, moral suasion plays no part. Anything that will administer a blow is used, be it a piece of 2x4, a halter shank with

bale wire to reinforce it, or a 5-ft. length of Italian locust, which, when dried, I have never seen broken no matter how much one hammers with it. The horses are led singly up to the door, the shank thrown over his neck and every one who can reach him safely starts to beat him into the car. If the car is empty or half full the first blow is enough, but when there are 9 or 10 horses in, of course they block the door-way, and it is the work of the animal to force his way in by shoving aside those already in. If he is not strong enough he is almost beaten into a pulp until he, in agony, will plunge into the car. If there are others already weakened by the voyage, they are apt to go down, and once down, in the crowded condition of the cars, I have never seen an animal get up and be worth anything after a 30 or 40 mile railroad ride. I trust that our government will not make this error in transporting these humble, willing, and, in the majority of cases, efficient co-workers, but give them a chance to stretch their stiffened legs, together with a night's rest and pure air and water, before continuing their journey.

However, there are times when animals do not submit meekly to brutal beatings. I witnessed the death of a soldier and a broken leg of another by a horse of which I had warned a soldier, and my thanks was a blow from a locust stick across the horse's nose. The horse, a big black ridgling, which had given us considerable trouble until we found that we could do much more by kindness than by any other means, instantly reared and lashed out with his front feet, which were shod, and struck his tormentor full in the chest which you could see collapse. The man fell unconscious to be removed to the hospital where, I was informed, he died later in the day, the majority of his ribs being broken. When other soldiers attempted to catch him the same horse stampeded over 200 already landed and broke a man's leg with a kick for striking him with a stick while within reach of his hind legs. After a half-hour's futile work the animal was placed in a car by two horsemen from the ship in a few minutes.

The mules are loaded in the same way with this exception, that instead of being led singly, they are herded in gangs of six and the soldiers, usually about 100 to 150, form a half circle with the ends resting on the two sides of the car door. They gradually close in, and the beatings the stubborn animals received made me see red the first time I witnessed it. As in the black ridgling case, there were mules that asserted themselves, and when they did,

things were lively. In one instance, I had a loop around the neck of a big brown mule of about 1200 lbs., which had been boss of his section all the way over and was in good physical trim. Sixteen soldiers tried to drag him into a car after he had burst things up several times. It was certainly a funny sight to see this mule, by a sudden plunge forward, catch the men off their balance and by a quick turn to one side every man was dragged off his feet. The officers in charge shouted to hold on and they obeyed orders and that mule, I think, took a malicious delight in picking the dirtiest and muddiest part of that corral where the overflow from the watering trough collected and dragging these men through it. Their uniforms were a sight. Of course the cattlemen offered their regrets which the soldiers returned in kind; and I was more than glad that neither understood the other. I made it a hard and fast rule that under no consideration was a soldier to touch an animal while he was yet upon the ship. I think in this way many weak animals, which would have been killed by the brutal handling of the soldiers, were landed. However, I always made it a point to call the attention of the officer in command to these animals, and after the first voyage they heeded my warnings.

A number of times I was called upon to assist in the unloading of other ships; and it was on these that I made the acquaintance of the ocean-going Horse Doctor and the ocean Cowboy, one in particular had as choice a collection of remedies as I have seen. I had to check up his drug list and found a gallon of tincture aconite, a pint tinct. nux vomica, a pint tinct. gentian, 5 gals. linseed oil, 2 gals. white liniment P. D. & Co., half-gallon aqua ammonia, 1 gal. turpentine. I noted a number of animals go off with a weak straddling gait and with the sheath much swollen, and in one instance with the penis extended fully and marked discharge and great swelling of the glans. On asking the cause I was given a very wise wink and the answer: "I know de treek", and nothing more. Later inquiries revealed the fact that nearly all of these animals died from cystitis and kindred urinary troubles; and one day when this veterinarian's assistant was badly in need of the price of a drink, I had revealed to me the secret of the "Treek". Nearly all of these animals were down; and as it would make a material difference in his bonus, he had given each horse a grain of strychnine sulphate hypodermically, and filled a two-ounce dose syringe with equal parts of white liniment, aqua ammonia and turpentine, and

had injected it into the urethra. What with the injection and the agony caused by the ammonia and turpentine, the animal had managed to get to his feet, and if he showed signs of weakening, another grain of strychnine was given. This same man, by the way, a Frenchman, has had mules whose hoofs have dropped off through neglect, in my opinion. I had charge of loading them and remarked at the time about the good condition of the animals; and when another veterinarian—this one a graduate—had the remainder of the consignment, 1180 odd, while the Frenchman had but 442, the losses were: for the graduate veterinarian, 5; for the Frenchman, 11, with the latter's stock all on the main and upper decks, while the former was handling three decks down.

In another instance, while assisting in the unloading of 490 horses, 14 were unable to come up the brow. I was sent for to see what should be done and found all of these animals suffering more or less from aconite poisoning, all the symptoms being present. Upon my asking what treatment had been given, I was told they had been given exhaustion mixture, the contents of which I found were equal parts of aconite, nitrous ether, belladonna and nux vomica, the dose being one ounce, to be repeated in 15 minutes, and then a grain of strychnine hypodermically. It is needless to say that they received no more exhaustion mixture. The animals were placed under my care for a week, when they were turned over to the government in fairly good shape.

Again, a mule was reported as having gone crazy and had been destroyed as being too dangerous to keep on board, but fairly good information indicated a case of spasmodic colic. At any rate the veterinarian hit the animal with a hatchet, and as the animal dropped, ordered the carcass thrown overboard. When it came to the surface, lo! the animal supposed to be dead started to swim after the ship.

When I was asked to make up a list of drugs for a ship, of which the veterinarian in charge said, upon looking it over, he thought it would do but that it lacked whiskey. When asked how much, he replied: "5 gallons." When asked what kind, he replied: "O! I like Green River."

When crossing either way I was always given the best accommodations possible and always tried to be a gentleman. It was hard to have to associate with some of these men who did not know how to conduct themselves in any way except to drink excessive

quantities of wine. Those of us who desired to be judged by our actions suffered more or less by the comparison.

It was not only to Italy that these men were put in charge of animals. I have witnessed the unloading of several shipments in Bordeaux. On one occasion a consignment of very fine Canadian medium-draft horses was landed. I never saw such a sight—proper drainage had not been maintained, and as the animals were all housed on deck, but arranged in two tiers with a wooden floor, the urine seepage had removed the better part of the hair from the back and sides and great sores had resulted, so that it would be weeks before these animals would be in a condition to work. It cannot be said that this condition would redound to the credit of the veterinarian. I do know that if given healthy horses and good feed one can be reasonably sure of landing a consignment that will be a credit to veterinary science, if one will only use properly trained men. An assistant I had with me for four voyages went as foreman under a veterinarian for the British, but on sailing the veterinarian was removed for intoxication and another could not be obtained in time so my assistant was intrusted with the entire charge. By using stimulants and paying attention to ventilation, feed, watering, etc., he landed a complete cargo of 870 head, every one in good physical condition. He had no serious trouble as the animals were shipped in good condition and the voyage short.

In conclusion I would urge everyone present to use his influence with anyone and everyone connected with the transport of horses—whether for war purposes now or peace pursuits after the war—to have competent men in charge of their cargoes; to pay them a respectable sum as a salary and award them a fair bonus based upon results obtained. While it may cost a little more, it will be compensated for by the results obtained. It is only the just due of the animals over which they have been placed. These animals are called upon to do the most hazardous work and constitute one of the great supply trunks which the British term the "Silent Service". They go where the mechanical transport cannot go. They are called upon to assist the same mechanical transport when it has gone beyond its depth: i. e., the made road; and I call your attention to the fact that this War of Wars is not being fought on macadamized roads. Wherever there is an advance these animals are the sole source of supply for the immediate needs, for without their aid exhausted supplies could not be replenished in time

to be of any service. When this war is won (and win we must and will) we will find that after we have had all our say about Liberty Motors and Standardized Army Trucks, we will have to take our hats off to the Liberty Army Horse and Mule.

—Lieut. J. E. Behney has been transferred from Kansas City, Mo., to Camp Hancock, Augusta, Ga.

—Dr. Frederick Low, formerly of Hankinson, N. D., is now with the Mobile Veterinary section at Camp Dodge, Ia.

—Major Olaf Schwarzkopf, formerly at St. Louis, Mo., is now stationed at Fort Snelling, Minn.

—Major Wm. Lusk is now with the American Expeditionary Forces in France.

—Lieut. H. K. Moore, formerly of Chicago, Ill., is stationed at Camp Logan, Houston, Texas.

—Lieut. C. W. Likely, formerly at Camp Funston, is with the American Expeditionary Forces.

—Lieut. W. H. Lynch of Portland, Me., is with the American Expeditionary Forces in France.

—Lieut. H. C. Nichols, formerly of Chicago, is stationed at Camp MacArthur, Waco, Texas.

—Dr. A. F. Malcom, formerly of Kansas City, Mo., is stationed at the Auxiliary Depot, Camp McClellan, Anniston, Ala.

—Dr. H. L. Shorten, formerly of Chicago, Ill., is now stationed at Camp Cody, Deming, N. M.

—Captain A. G. Fraser is stationed at Camp Logan as Camp Veterinarian.

—Lieuts. Jean Underwood, V. R. C., Spencer K. Nelson, V. R. C., and Guy M. Parrish, V. R. C., of the 88th Division, at Camp Dodge, Iowa, have made applications for membership to the A. V. M. A. This makes a total of eighteen applications for membership to the A. V. M. A. received from Camp Dodge, Iowa.

The veterinarians of that cantonment are a very progressive lot of young men. They have formed a Veterinary Medical Society which holds regular weekly meetings for the purpose of discussing scientific and professional subjects. They have further shown their interest in the welfare and advancement of their chosen profession by becoming members of its national association. May

many more emulate their spirit of cooperation and enthusiasm and step forward and assist in keeping the A. V. M. A. a strong, well organized, efficient and progressive organization.

—1st Lieut. Ralph A. Moye, V. C., N. A., has been relieved from duty with the 88th Division and made Camp Veterinarian at Camp Sherman, Chillicothe, Ohio.

—1st Lieut. Lawrence A. Mosher, V. C., N. A., has received his promotion to Captain, V. C., N. A. Captain Mosher has been transferred from Camp Dodge, Iowa, to Camp Dix, Wrightstown, N. J., as Camp Veterinarian.

—Lieut. Clifford C. Whitney, formerly of College Station, Texas, is now stationed at Fort Leavenworth, Kansas.

—Dr. Bernard Johnson, formerly of Spokane, Wash., has been called to active duty in the Veterinary Reserve Corps and is now at Colville, Wash.

—Lieut. F. A. Drown, formerly of Kellogg, Iowa, is now stationed at Camp Greenleaf, Fort Ogelthorpe.

—Lieut. Edward Lapple, formerly at Camp Mills, L. I., is with the American Expeditionary Forces.

—Captain H. S. Eakins has been transferred from Camp Kearney, Calif., to Camp Funston, Kansas.

—Captain W. B. Maxson, formerly at Camp Lee, Va., is now with the American Expeditionary Forces in France.

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—The summer meeting of the Missouri Valley Veterinary Association will be held at Omaha, Neb., July 15, 16, 17.

—Dr. M. F. Barnes has removed from Franklin to Philadelphia, Pennsylvania.

—Dr. H. V. Cardona has removed from New Orleans, La., to Mobile, Ala.

—The marriage of Miss E. Mildred St. John, Ithaca, N. Y., and Dr. Fred W. Cruickshanks, Fernsdale, Calif., occurred June 8, at the home of the bride. Dr. Cruickshanks reports for service in the Reserve Officers Medical Corps July 1.

—Dr. J. W. Joss has removed from Lincoln, Neb., to East St. Louis, Ill.

—Dr. O. C. Newgent has removed from Terre Haute, Ind., to Hume, Ill.

# AMERICAN VETERINARY MEDICAL ASSOCIATION

## ATTEND THE PHILADELPHIA MEETING

*To the Members of the A. V. M. A.:*

Undoubtedly you are already aware that the next meeting of the American Veterinary Medical Association will be held at Philadelphia from August 19th to August 23rd, inclusive.

If you have attended any of the previous association meetings I am sure that you are convinced of the great benefits resulting to the profession as a whole as well as to the individual veterinarian from such convocations of the members of the association. On the other hand, were you not so fortunate as to be able to attend on previous occasions, suffice it for me to refer you to anyone of those who did attend.

As we peruse the history of the veterinary profession in this country, we are not a bit surprised to find that the American Veterinary Medical Association has been the greatest factor in building up the profession to its present lofty state, and still is the pillar upon which further advancement is relied upon. But how did the association accomplish its glorious work? How was it in a position to know the needs, opinions, suggestions and advice of the individual members? The answer to these questions is, *by and through the annual meetings of the association.* This fact cannot be too greatly emphasized. The existence alone of the association could afford but limited aid to the profession were it not for its yearly gatherings, at which, in addition to the demonstrations of points of special interest to the practitioner, the voices of the individual members are heard, and suggestions and advice offered for the elevation of the profession and resulting betterment of the conditions of the individual members. Yes, the meetings have shaped the destinies of the veterinary profession in this country.

In these trying times, when history is being written before our very eyes, when hundreds of thousands of our boys are engaged in the blood struggle on the other side, the veterinary profession has not been found wanting. Thousands of our veterinarians are serving with the colors here, and "over there". They do everything in their power to make the world, in the words of our president, a decent place to live in. For this and other reasons it is even more imperative for each and everyone of us to attend the next meeting of the American Veterinary Medical Association.

Those that are across and many of those in the camps and other military establishments in this country will not be able to attend, owing to pressing duties devolved upon them. We must therefore fill their places with those of us who can spare their time for this purpose. We must show those of our members who are in the military service that we shall not permit the decline of the interest in the association during their absence.

*Therefore make it your duty to attend the next meeting of the A. V. M. A. at Philadelphia.* Don't let trifling matters stay in the way of this great duty on your part.

The Committee on Arrangements promises the next meeting to be one of the most interesting we ever had.

I am certain that you will not regret the little inconvenience you may have to undergo to be present at this meeting.

L. Enos Day, Acting Secretary.

## THE A. V. M. A. MEETING, AUGUST 19 TO 23, 1918, AT PHILADELPHIA

In this epochal year of 1918, Pennsylvania is to be accorded the coveted privilege of entertaining the 55th annual convention of the American Veterinary Medical Association.

In many respects this meeting will be the most important in the history of the association. In fact, the future welfare of the veterinary profession may be largely influenced by the spirit of cooperation and policies to be developed at the meeting.

War has wrought changes with us as with every other line of work concerned with the best interests of our communities and the nation at large. Our profession has assumed an importance, and is being accorded such recognition that we are now occupying a more prominent position, not only in army matters, but also in the important movements to conserve and increase the supply of food animals and those used in transportation by the armies and commercial industries.

If we are to meet these increased obligations successfully, it is essential that we keep abreast of the changes that are occurring and be prepared with fullest information on subjects that are intimately connected with our work.

There is no better way of keeping in touch with the progressive changes that are being brought about by the leaders of our pro-

fession, than a great international meeting of thinkers and workers. At a meeting of this kind there are many valuable thoughts expressed and policies promulgated which will never reach the great body of general practitioners through any other source than by being in attendance and coming in personal contact with fellow workers who labor in environments that differ in many respects.

At the Philadelphia meeting we will have with us a number of men who are intimately and actively concerned with matters that are of the utmost importance to the veterinary profession. There will also be in attendance, representatives from the great Allied Nations, who have seen war and experienced war, they will tell us of the requirements demanded of our profession by war conditions.

Although this meeting will be of serious importance it will not be all work. Extensive plans are being made for entertaining the members and guests, particularly the ladies, with instructive and interesting sight seeing trips in and about the city. Philadelphia and its environments are rich in historical association with the founding, growth and developments of the United States. The great war has made it the center of industrial activity in the production of munitions and ships. A ride along the Delaware River with its banks lined for miles with great ship yards in which many hundreds of vessels are being constructed, will be a rare and interesting sight. The close proximity of Philadelphia to Atlantic City and the Ocean, with excellent train service and beautiful roads, afford unusual opportunities for short outings.

Taken in all, this approaching meeting in August bids fair to mark an epoch in the history of the A. V. M. A. from which future association events will be reckoned. W. S. GIMPER.

## ASSOCIATION MEETINGS

### MICHIGAN-OHIO VETERINARY ASSOCIATION

At a meeting of veterinarians from Monroe, Lenawee, Hillsdale, Jackson and Washtenaw Counties, Michigan, and Fulton County, Ohio, April 24th, the Michigan-Ohio Veterinary Association was organized. Dr. A. L. Tiffany of Monroe, Mich., was elected president; Dr. G. D. Gibson of Adrian, Mich., vice president; and Dr. A. J. Kline of Wauseon, Ohio, secretary and treasurer.

The meeting was largely given over to the subject of sterility in cows. Dr. R. I. Bernath presented an excellent paper on sterility. The paper was thoroughly discussed by Drs. Hallman, Kline and Dunphy. Dr. Hallman dwelt upon the uterine pathology and emphasized the importance of keeping in mind the fundamentals of treatment for sterility, i. e., drainage, disinfection and irrigation. Dr. Kline told of the necessity of educating the farmer along the lines of sterility treatment. Dr. Dunphy related some of his experiences in uterine irrigation and expressed a desire to see quince mucilage, containing one per cent of the iodide of silver, used after the uterus had been thoroughly cleansed.

Dr. Hallman of the Michigan Agriculture College demonstrated methods of diagnosing early pregnancy, and treatment for sterility, on subjects procured for the occasion.

A short evening session was given over to perfecting the organization and a discussion of prices. It was arranged to hold an outdoor meeting, which is to include the families of the veterinarians, early in August, at Wamplers Lake.

A. J. KLINE, Secretary.

## LOUISIANA CONFERENCE

Louisiana's tick eradication forces of the U. S. Bureau of Animal Industry on a call issued by Dr. E. I. Smith, Inspector in Charge, assembled in conference at Shreveport, La., on May 18th. The City Hall, Shreveport's stately municipal structure, was donated for the purpose to the B. A. I. visitors, accompanied by a cordial welcome from the Honorable Mayor, John McW. Ford, and warmly responded to on behalf of the Bureau by the Inspector in Charge, Dr. E. I. Smith.

Nothing so inspires tick eradicators than a get-together meeting, as a conference is classed to be, and Dr. E. P. Flower, Executive Officer of the Louisiana State Live Stock Sanitary Board, enthused all present by his address on "Our State Livestock Possibilities". No one is better qualified to know what Louisiana holds forth as a livestock center, and the doctor stated the livestock cattle census on recent figures gave Louisiana a total of 1,250,000 head of beef and dairy cattle.

The state-wide tick eradication laws of Louisiana, Dr. Flower declared, were the best laws enacted for constructive legislation,

and all research by legal lights to test the drasticity of this measure failed to find a weak link in the chain, and consequent action of cattle owners by dipping will hasten the raise in standards and importations of males that will undoubtedly put the State of Louisiana in the front rank as a cattle producer, with its splendid grasses and climatic favors.

In the 14 parishes already in the free area the improvement in the cattle is 75 per cent over the conditions when the same parishes were tick infested.

The conference was unexpectedly honored by the appearance of Dr. W. B. Ellenberger of Washington, D. C., in the Tick Eradication Division of the Bureau, who regaled the assembly with reminiscences of the older days when the doctor was working in the field and tick eradication was in its infancy and had not attained its present broad scope; that was before the dipping vat came into existence and ticks were eradicated by the laborious lubricating method.

A distinctive point brought out by the doctor indicated that a tick eradicator of necessity must dip the farmer's cattle whether the farmer was in favor of it or not, while in demonstration work all suggestions are optional with the farmer, showing conclusively the harder task of eradication of ticks as compared to farm demonstration, that he realized long ago that the tick eradication was not a sick man's job, but required vim and vigor, and plenty of backbone to succeed, so he came to listen to the discussions as he knew the conference was of the right sort to give out valuable information along the line of handling tick eradication propaganda on a state-wide basis.

Dr. H. L. Darby, Inspector in Charge in West Texas, in a spirited address won the conference by his suggestions that tick eradication is a war measure, a conservation of meat and milk, deserving the consideration that is accorded other foodstuffs and the state food administrators and Council of Defense attention to be brought to this fact; thereby materially increasing our meat and milk supply, improving our cattle industries and aiding the early completion of tick eradication, resulting in the saving of millions of dollars. Dr. Darby is nothing if not original, always weaving out something good and new that is food for thought.

A deviation from the regular grind of a business conference was an address in French on tick eradication, delivered by Mr. J.

G. Richard, "A La Paroisse Evangeline", which was highly entertaining and instructive.

Doctors H. L. Darby of West Texas, Marvin Gregory of Arkansas, J. A. Barger of Mississippi, and W. B. Ellenberger of Washington, D. C., were visiting inspectors in charge, who clearly gave to the conference enlightenment on many intricate questions of importance in addresses generously applauded.

Louisiana is in the midst of a drive on the cattle fever tick and it is expected that over one million head of cattle will pass through the dipping vats twice each month for the balance of the 1918 season, and if the confidence displayed by the Bureau men in the field attending this conference is any criterion, it can be confidently stated that the day of the tick in Louisiana will in a short period be a thing of the past, and the State take its rank in the forecolumn of livestock centers.

E. HORSTMAN.

## PENNSYLVANIA DIVISION OF THE B. A. I. VETERINARY INSPECTORS' ASSOCIATION

At a meeting of the B. A. I. veterinarians of Philadelphia, held at the Veterinary Department of the University of Pennsylvania, June 5, 1918, there was organized "The Pennsylvania Division of the B. A. I. Veterinary Inspectors' Association". Addresses were made by Dr. W. Horace Hoskins of New York City, and Dr. Thomas Kean, travelling inspector for the B. A. I. All the veterinarians on the Philadelphia force joined the association. An effort is being made to have every veterinarian in Pennsylvania employed by the B. A. I. enrolled as a member. The object of the association is to have every member belong to the American Veterinary Medical Association and have that association, through its Legislative Committee, look after the interests of the veterinarians.

The following officers were elected:

President, C. S. Rockwell; secretary, M. J. Maloney.

## NEBRASKA VETERINARY MEDICAL ASSOCIATION

The following resolutions were passed by the Nebraska Veterinary Medical Association, May 9, 1918:

*Resolved*, That the Nebraska Veterinary Medical Association in special session recommend:

1. That the University of Nebraska give only such instruc-

tion in veterinary medicine which is given so thoroughly that it may be accredited towards a degree in veterinary science given by any reputable veterinary college. That the veterinarians employed in the University of Nebraska presenting such courses that tend to lower the standard of the profession and not meeting the above high standard, by creating empirics, be denied membership in the State Association.

2. That the resolution adopted by the M. V. V. A., Feb. 20, 1918 (a copy of which is hereto attached), relating to the activities of county agents be endorsed by this association and a copy of same be sent to Secretary of Agriculture Houston. Also inform Hon. Mr. Houston that no cooperation exists at this time between the county agents and the licensed graduate veterinarians of this State.

3. That the Secretary of Agriculture direct that control and educational work in veterinary science be conducted by the B. A. I. and the State Live Stock Sanitary Boards and not by the State's Relation Service and the extension departments.

4. That a uniform high standard of entrance requirements of at least a four-year high school course or equivalent for all veterinary colleges, State or private, be adopted. That State Board of Examiners adopt such requirements for examination for licenses beginning 1922 so that present students may not be excluded.

5. That the Committee on Intelligence and Education of the A. V. M. A. submit at the next regular meeting in Philadelphia the above recommendations in regard to veterinary instruction in agricultural colleges and the above entrance requirements in all veterinary colleges.

The above to be considered in the interests of the livestock producers so that the most competent veterinary service available may be secured.

## RESOLUTIONS PASSED BY THE M. V. V. A., FEB. 20, 1918

WHEREAS, Public necessity demands a high standard of qualifications in the learned professions, viz.: Law, the Ministry, Human Medicine, Agriculture, Dentistry, Veterinary Medicine; and

WHEREAS, It is impossible as a general rule and practice for any set of men to become proficient in more than one of these learned professions; and

WHEREAS, The County Agent, unless he be at least a graduate

veterinarian, cannot efficiently and intelligently engage in the practice, teaching or demonstration of any branch of veterinary science; and

WHEREAS, The attempt on the part of County Agents who are not graduate veterinarians to so engage in the practice, teaching or demonstration of any branch of veterinary science is in violation of the principle of a high standard of qualifications in the learned professions; and

WHEREAS, The violation of this principle opens the way and leads to a lowering of the standard of veterinary science, incompetent veterinary service to livestock producers, and promotes empiricism and supplants those properly trained to deal with veterinary problems; and

WHEREAS, The livestock industry of America and the people of this Nation demand the most competent veterinary service available; and

WHEREAS, The lowering of the professional standard will in the end prove disastrous to the livestock industry; and

WHEREAS, The duties of the County Agent pertaining strictly to agriculture and horticulture require all his ability and energy without such agent engaging in veterinary activities; and

WHEREAS, The veterinarians, members of the Missouri Valley Veterinary Association, do heartily affirm the County Agent plan, provided County Agents will not violate the essential principles governing and regulating the learned professions by engaging in veterinary work; and

WHEREAS, The members of this association, realizing the immense responsibility to the nation in this time of national peril, do hereby pledge all their skill and energy and their lives to the service of our great country and do indorse a higher educational standard for the veterinary profession; be it

*Resolved*, That the Missouri Valley Veterinary Association, one of the largest bodies of practicing veterinarians in the world, hereby requests the Honorable David Houston, the United States Secretary of Agriculture, to issue a national order forbidding County Agents engaging in any veterinary activity whatsoever, either advisory or regulatory, and to refer all veterinary problems to competent graduate veterinarians; and be it

*Resolved*, That the secretary of this association make this resolution a part of the minutes of this meeting and that he send a copy to the Honorable David Houston.

# COMMUNICATIONS

## DIBOTHRIOCEPHALUS LATUS

*Editor Journal of the American Veterinary Medical Association, Ithaca, N. Y.:*

Dear Sir:

In an article by Hall and Wigdor which appears on page 355 of your June issue, there occurs the following statement: "The first record of which we are aware is one by Van Es and Schalk (1917) who report what they call *Dibothriocephalus latus* from a dog at Agricultural College, N. D. Their specific determination is apparently casual, being only incidental to work on anaphylaxis, and is presumably based on the fact that the worm was a bothriocephalid tapeworm and that *D. latus* is one of the commonest and best known of these worms from the dog."

May we not use a little of your space for a word or two of protest with regard to the manner in which attention is called to the occurrence of the parasite mentioned? While the finding of this tapeworm was of no primary importance to us, we object to having our published statement about it questioned without a stated reason. The terms "what they call"; "is apparently casual"; and "presumably based" certainly would indicate that Hall and Wigdor deem us capable to use in a scientific publication a specific name, merely because the tapeworm happened to belong to the bothriocephalids, and that "*D. latus* is one of the commonest and best known of these worms of the dog". We feel compelled to deny that we are guilty of such carelessness and lack of sense of responsibility.

Likewise we must deny that our publication contains anything which would in the least justify Hall and Wigdor to conclude that "their specific determination is apparently casual". In our publication we refer to the finding of the parasite as follows: "The autopsy disclosed the presence of two specimens of *Belascaris marginata* and one of *Dibothriocephalus latus*". (Page 184.) At one other place a similar statement was made. We believe that those sentences contain nothing "apparent" of a casual determination, nor anything else suggestive of the slip-shod manner of dealing with facts as Hall and Wigdor attribute to us.

It is true that we determined the *D. latus* as such but the very consciousness of the fact that we are not parasitologic specialists compelled us to caution, and hence we sought the counsel and assistance of Dr. B. H. Ransom of Washington, D. C., who was kind enough to confirm our determination. Only after those precautions did we undertake to name the parasite as we did.

Hoping, Mr. Editor, that this explanation in a measure clears away the result of the imputation of the carelessness on our part, and thanking you for your kind consideration, we beg to remain

Very truly yours,

L. VAN ES AND A. F. SCHALK.

## STATEMENT CONCERNING PROPOSED AGREEMENT BETWEEN THE KANSAS STATE AGRICULTURAL COLLEGE AND THE KANSAS CITY VETERINARY COLLEGE

For sufficient reasons, largely growing out of the war, the officers of the Kansas City Veterinary College have decided to abandon the field of education in veterinary medicine, and in order to conserve as much as possible the interests of the alumni, former students and students of the Kansas City Veterinary College, they have decided to transfer to the Kansas State Agricultural College all of the good will and the academic records of the Kansas City Veterinary College.

The Kansas State Agricultural College, in accepting the records of students of the Kansas City Veterinary College and the good will of that institution, engages: (1) To preserve the academic records of the Kansas City Veterinary College and to respond to all inquiries for information concerning the educational history and scholarship of graduates and former students of the veterinary college; (2) whenever it prints lists of its own alumni to print lists of the alumni of the Kansas City Veterinary College, accompanied by a suitable statement concerning the relations of the two institutions; (3) to receive as junior students all high school graduates who have taken the full freshman and sophomore work of the Kansas City Veterinary College from 1916 to 1918, and give evidence of sufficient training in the branches studied; (4) to accord sophomore standing to all high school graduates who as students of the Kansas City Veterinary College have taken within the period of 1916 to 1918, the full work required of a freshman student, and give evidence of sufficient training in the branches studied; (5) to receive on recommendation of the officers of the Kansas City Veterinary College students of that institution who are not high school graduates, and to allow them opportunity to make up deficiencies in the regular entrance requirements of the agricultural college; (6) to facilitate in all ways consistent with the standard requirements for graduation at the agricultural college, completion of the curriculum of that institution, and graduation with the degree of Doctor of Veterinary Medicine of any student of the Kansas City Veterinary College.

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—Dr. E. M. Pickens has resigned from the N. Y. State Veterinary College at Cornell University to accept a position at the Experiment Station, College Park, Md.

—Dr. C. E. Mootz, formerly at Chicago, Ill., was recently transferred by the Bureau of Animal Industry to Wheeling, W. Va.

# REVIEWS

## MASTITIS OF THE COW

SVEN WALL
Assistant in the Veterinary High School at Stockholm. Authorized translation with annotations by Walter J. Crocker, B.S., V.M.D., Professor of Veterinary Pathology, University of Pennsylvania.
pp. XI-166 with 29 illustrations.
J. B. Lippincott Company, Philadelphia and London. 1918.

The author of this book is known to students of comparative pathology, especially for his work in connection with infectious abortion. This volume on "Mastitis of the Cow" is based on the investigation of milk from diseased udders and subsequent autopsy of the udders. A large part of the material was of a tuberculous nature but there were about 50 cases of other infections. The bacterial content was determined from not less than 70 bacterial isolations and the histological changes were determined from a study of 30 different preparations. The clinical descriptions accompanying various forms of mastitis was determined by the author from his own veterinary practice and upon the cows in which he produced artificial infection, together with the data on uncommon forms of mastitis contributed by other veterinarians.

The contents of the book is divided into 18 chapters in which the following subjects are discussed: I, udder of the cow; II, mastitis in general; III, mastitis caused by external forces; IV, infectious mastitis in general; V, types of infection; VI, udder streptomycosis; VII, udder staphylomycosis; VIII, udder colibacillosis; IX, udder pyobacillosis; X, udder tuberculosis; XI, udder actinomycosis; XII, necrobacillosis; XIII, clinical diagnosis of mastitis; XIV, autopsy, post mortem technique; XV, importance of mastitis to milk control; XVI, importance of mastitis to meat inspection; XVII, post mortem report; XVIII, a few reports of contagious udder infections. The translator has placed in brackets a few annotations for the purpose of including valuable information on conditions prevailing in this country and in a few instances including new data on the subject.

The discussion of the various subjects is in most cases brief and to the point. In classifying mastitis the author refers to the parenchymatous tissue and the connective tissue or stroma. Bacterial invasion of the interstitial connective tissue is termed stroma

infection or interstitial mastitis. Bacterial invasion of the tubulo-alveolar system or parenchymatous passages, and necessarily the milk which is contained in them, he calls *parenchyma infection* or *milk infection*, the presence of which is manifested by reaction on the part of the body to a bacterial irritation called *parenchymatous mastitis*. This may be primary or secondary, depending upon the manner of inception, acute or chronic, depending upon its duration, and, based on the character of its inflammatory exudate, it is classified as *catarrhal, sero-hemorrhagic, croupous, purulent*, or *croupo-purulent mastitis*. He also recognizes *interstitial mastitis* and *gangrenous mastitis*, which complete his classification.

In discussing the subject of milk invasion, the author states that in spite of the "before mentioned obstacles to infection, one or more bacteria may gain entrance but these may be taken up and destroyed by the ever present leucocytes which are more or less numerous. The leucocytes play a very important part inasmuch as they inhibit the invasion of the milk by the bacteria". The investigation of bacteria in milk in the normal, healthy udder of cows that have been made not only in this country but also in Europe indicate that milk as it leaves the udder is not as free from these organisms as the author's investigations indicate. The early work of Leopold Schultz and Gernhardt and later that of Bolley and Hall, Ward, Moore, Conn and others, indicate that milk in the normal udder contains a considerable number of bacteria. The fact should not be overlooked that Sven Wall has worked in a country farther north than any of the others and it is possible that the conditions there are different than in more southern latitudes.

It will be noted from the title of the chapters that in discussing the different types of infection, he has used the term *streptomycosis, staphylomycosis*, etc., to describe the lesions brought about by these organisms following the practice introduced by Ligniéres many years ago in connection with the *pasteurella* in which he used *pasteurelloses* to designate the disease produced by the septicemia hemorrhagica group of bacteria designated *pasteurella* by Trevasan. A good deal of space is given to the description of the invading organisms, methods for their cultivation and pathogenesis. Under colibacillosis he includes *Bacterium lactis aërogenes* with the colon bacillus. He has given a quite full description of *Bacillus pyogenes* and its presence in udder lesions.

In udder tuberculosis he has described two types (1) primary udder tuberculosis, including infection through the teat canal and infection through wounds, and (2) secondary or embolic tuberculosis. He estimates that about 10% of all cases of udder tuberculosis are primary and caused by infection through the teat canal but primary infection through wounds is very rare. Secondary or embolic udder tuberculosis is the most common and constitutes approximately 90% of all cases. In this connection he has given valuable information from his own experience.

The last chapters deal with the clinical diagnosis of mastitis and the technique of making the examination and a series of post mortem descriptions of udders affected with the different forms of mastitis as determined by their etiology such as streptomycosis, pyobacillosis, etc.

In dealing with the treatment of various udder troubles, he has not discussed the use of bacterins which are extensively used in this country and have been found to be beneficial in some cases but apparently useless in others. An authoritative opinion on this subject would have been helpful. The more recent practice of using formalin, which has been reported to be very beneficial when administered internally, is not discussed.

The volume contains the results of the author's investigations and the methods which he has employed. The illustrations are largely diagramatic but their reproduction is not of the best. Most of them, however, are helpful in illuminating the points at issue. The publishers have done their part in making this an attractive volume. It should be carefully read by veterinarians who have an extensive cattle practice. V. A. M.

## WOUNDS OF ANIMALS AND THEIR TREATMENT

HARRISON SMYTHE, M.R.C.V.S., Civil Veterinary Surgeon, Attached A. V. C. Alex Eger, Chicago, Ill.

This book of 194 pages, including a fairly complete index, is of convenient size and contains a considerable amount of information. The author has kept abreast of the times and refers to special articles pertinent to his subject, which have appeared in recent veterinary literature.

The first five chapters are of an introductory and somewhat elementary character and deal with the pathology of wounds, in-

fection, the general and surgical treatment and complications and sequelae. The author is not especially partial to antiseptics and doubts if the results gained by their use justify the great faith placed in them by a confiding public. He emphasizes drainage and summarizes as a routine treatment for ordinary wounds: (1) the provision of drainage; (2) maintenance of blood supply; (3) admission of air; (4) removal of pus and cleansing of the wound by the use of harmless fluids such as normal saline solution; (5) removal of necrotic and diseased tissues, when present. Other chapters deal with the wounds of the head and neck, trunk, open joint, wounds of the bursae, and tendon sheaths, limbs, feet, fistulae and sinuses, castration wounds, uterine and vaginal wounds and wounds involving bone tissue. The discussions are brief but interesting and practical. There is no claim of fresh and original theories nor the presentation of matter startlingly new, but he describes in a clear and concise way the methods which in his experience have given good results.

The final chapters on war wounds, use of vaccines and dietetics and hygiene could have been expanded with benefit to the reader. Because of its conciseness and up-to-dateness it should be of especial interest to veterinarians. P. A. F.

## NECROLOGY

### THOMAS E. HUGHES

Dr. Thomas E. Hughes, a member of the American Veterinary Medical Association, died June 3.

—The officers of the Mississippi State Veterinary Medical Association for the present year are: President, Dr. W. R. Edwards, Vicksburg; vice president, Dr. E. S. Norton, Greenville; secretary-treasurer, Dr. J. A. Beavers, Canton.

—Veterinary Inspector F. Kickbusch has been transferred from Grand Rapids, Wis., to Milwaukee.

—The Wisconsin Veterinary Medical Association will meet at Monroe, July 16, 17, 18.

## MISCELLANEOUS

—Higher Standards. In the interest of higher education the War Department has recommended, and this recommendation has received the concurrence of the Civil Service Commission, the Secretary of Agriculture and the Committee on Intelligence and Education of the American Veterinary Medical Association, that Regulation I of the Regulations Governing Entrance to the Veterinary Inspector Examination (Circular A-16) of the Bureau of Animal Industry be amended. In accordance therewith it has been ordered that Regulation I of the above circular be amended to read as follows, to become effective at the beginning of the 1918-19 session of veterinary colleges:

Regulation I—Matriculation. The matriculation requirement which shall be adopted by each accredited veterinary college shall be at least two years of high school education of at least seven credits (units) or their equivalent as certified by the commissioner on education or a similar official of the State where the student resides.

—Dr. H. W. Witmer, with the State Department of Florida in cholera work, has been transferred from Fort Pierce to Bradentown, Fla.

—Dr. E. A. Cahill has resigned as Resident State Secretary of the A. V. M. A. for Massachusetts and has accepted the position of Manager of the Biological Farm of the Pitman-Moore Co. of Indianapolis, Ind.

—Dr. T. J. Eagle is representing the Government in the States of Kansas and Missouri where the Department of Agriculture is endeavoring to formulate plans whereby there may be cooperation in the eradication of tuberculosis.

—Dr. B. E. Cheney has removed from Corpus Christi, Texas, to Plaquemine, La.

—Dr. J. H. Knox has removed from Great Falls, Montana, to Warner, Alberta, Canada.

—The Municipal Civil Service Commission will receive applications for examination for veterinarian at the Municipal Building, Manhattan, Room 1400, until July 1, 4 p. m.

—The next meeting of the Maine Veterinary Medical Association will be held at Portland, July 10.

—Dr. H. L. Darby has removed from Fort Worth, Texas, to Cleveland, Ohio.